
Site Health and Safety Plan

Cedar Chemical Corporation Investigation and Remediation Activities

Helena - West Helena, Arkansas

Prepared for:

Exxon Mobil Corporation and Helena Chemical Company

Prepared by:

Geomatrix Consultants, Inc.
5725 Highway. 290 West, Suite 200B
Austin, Texas 78735

March 2008

Project No. 13636



Geomatrix

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SITE HEALTH AND SAFETY PLAN

1.0 PURPOSE

This site Health and Safety Plan outlines the health and safety procedures that shall be followed during field work conducted at the Cedar Chemical Corporation Site located in Helena-West Helena, Arkansas. The observance and practice of the procedures in this plan are mandatory for all Geomatrix employees at the site. All subcontractors shall be made aware of the requirements of this plan; however, subcontractors are responsible for the health and safety of their own employees and for following all applicable federal, state, and local regulations.

This plan has been reviewed by the Project Manager and Project Health and Safety Officer. Prior to entering the site, Geomatrix personnel shall read this plan and be familiar with health and safety procedures it describes. A copy of the plan shall be available on site during all work activities for inspection and review.

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2.0 ADMINISTRATIVE INFORMATION

Project Name: Cedar Chemical Corporation Facility Investigation & Remediation Activities

Project Start Date: May 2008

Project Number: 13636.000.0

Project Address: Cedar Chemical Corporation

Helena-West Helena, Arkansas

Client: Exxon Mobil Chemical Company and Helena Chemical Company which
comprise the current membership of the Cedar Chemical Corporation Site
Joint Defense Group.

Client Contact: Dave Roberson

Telephone No.: (281) 363-8733 (Work)

Project Manager: Kelly Beck

Telephone No.: (512) 494-0333 (Work) (512) 569-1536 (Home)

Project Health & Safety Officer: Don Kubik Jr., PG, CIH

Telephone Nos.: (510) 663-4100 (Work) (510) 368-6433 (Cell)

Site Safety Officer: Charles Young (or Field Supervisor, if Mr. Young is not present)

Telephone No.: (713) 356-2221 (Work)

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3.0 PROJECT DESCRIPTION

3.1 SITE HISTORY

The Cedar Chemical Corporation site (Site) operated as a former chemical manufacturing plant from 1970 until 2002. During this time, the Site was used for the production of various herbicides, pesticides, organic chemicals, and inorganic chemicals in production units at the facility. In addition to chemical production, plant activities included product formulation and packaging. Chemical production occurred in batched and fluctuated based on the season.

Cedar Chemical Corporation abandoned the Site in 2002 after filing for bankruptcy, and the Arkansas Department of Environmental Quality (ADEQ) assumed control of the Site in October 2002.

3.2 SITE PHYSICAL DESCRIPTION

The Site is relatively flat with some gentle sloping toward the southeast, and site soils consists clay, sand and silt alluvial deposits. Groundwater is present in some areas in a shallow perched zone, and across the site in a deeper alluvial aquifer. Figure 1 shows the site location.

3.3 TYPE OF FIELD WORK

The project work will be conducted in accordance with the “Site Work Plan.” The project work will consist of drilling, well installation, soil and groundwater sampling, soil removal, wipe sampling, assessment and possible removal of drums, and long-term remedial actions that have yet to be defined.

3.4 SCOPE OF FIELD ACTIVITIES

Geomatrix will be on-site to perform certain of the investigation and remediation work activities, and oversee others as the client representative. The scope of work currently includes the following:

1. Rotosonic, cone penetrometer testing and direct push investigations;
2. Soil and groundwater sampling;
3. Monitoring well installation;
4. Sampling monitoring, agricultural, and domestic wells;
5. Soil excavation;
6. Drum assessment and possible removal;

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7. Waste sampling; and
8. Wipe sampling.

Geomatrix will oversee the following field tasks to be subcontracted by Geomatrix for the project:

1. Rotasonic, DPT, and CPT drilling.
2. Opening of the drum vault and assessment and possible removal of drum vault content;
3. Demolish pavement, slabs, foundations and other surface and subsurface improvements within the planned excavation area;
4. Excavation of chemically-impacted soil;
5. Stockpiling the excavated soil in separate stockpiles; and
6. Loading, transporting, and disposition of demolition debris and stockpiled soil at an appropriate recycling or disposal facility.
7. Waste disposition in general.

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4.0 PRIMARY RESPONSIBILITIES

4.1 PROJECT MANAGER

The Project Manager (PM) shall:

1. direct all Geomatrix personnel involved in investigative, monitoring, and remedial activities at the site and vicinity;
2. make the Project Health and Safety Officer aware of all pertinent project developments and plans;
3. make available those resources that are necessary for a safe working environment; and
4. maintain communications with the client, as necessary.

4.2 PROJECT HEALTH AND SAFETY OFFICER

The Project Health and Safety Officer (PHSO) shall:

1. review all health and safety aspects of investigative, monitoring, and remedial activities conducted by Geomatrix personnel at the site and vicinity;
2. ensure that all Geomatrix personnel have received required training, are aware of the potential hazards associated with site operations, have been instructed in the work practices necessary for personal health and safety, and are familiar with the site Health and Safety Plan's procedures for all scheduled activities and for dealing with emergencies;
3. review any accident/incident reports;
4. modify the site Health and Safety Plan as required based on accidents/incidents and findings regarding personnel exposures and work practices; and
5. report all accidents/incidents and findings regarding personnel exposure and work practices to the Project Manager, and manage any associated required regulatory reporting.

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4.3 SITE SAFETY OFFICER

The Site Safety Officer (SSO) shall:

1. ensure that appropriate personal protective equipment is available for Geomatrix site personnel and enforce proper utilization of personal protective equipment by all on-site Geomatrix personnel;
2. with guidance from the PHSO, observe subcontractor's procedures with respect to health and safety. If the SSO believes that a subcontractor's personnel are or may be exposed to an immediate health hazard, the SSO shall suspend the subcontractor's site work. If the subcontractor's personnel do not have required protective equipment, the SSO shall consult with the PM or PHSO before proceeding with the work;
3. implement the site Health and Safety Plan and report any observed deviations from site conditions anticipated in the plan;
4. conduct site safety tailgate briefings each day;
5. calibrate monitoring equipment daily and properly record and file results;
6. under direction of the PHSO perform required exposure monitoring;
7. maintain monitoring equipment or arrange maintenance as necessary;
8. assume other duties as directed by the PM or PHSO; and
9. report observed accidents/incidents or inadequate work practices to the PHSO and the PM.

4.4 PROJECT PERSONNEL

Project personnel involved in on-site investigations and operations shall:

1. take reasonable precautions to prevent injury to themselves and to their fellow employees;
2. perform only those tasks that they can do safely and immediately report accidents and/or unsafe conditions to the SSO or PHSO;
3. follow the procedures set forth in the site Health and Safety Plan and report to the SSO or PHSO any observed deviations from the procedures described in the plan on the part of Geomatrix or subcontractor personnel; and

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4. inform the PM and PHSO of any physical conditions that might affect their ability to perform the planned field tasks.

4.5 TRAINING REQUIREMENTS

All project personnel must comply with OSHA regulations specified in 29 CFR 1910.. These include completion of a 40-hour health and safety training course, an annual 8-hour refresher training, and participation in Geomatrix Consultants' medical surveillance program and respiratory protection program.

Additional site-specific training that covers on-site hazards, personal protection requirements, decontamination procedures, and emergency response information as outlined in this site Health and Safety Plan will be given by the PHSO or SSO before beginning on-site work. Site-specific training briefings will be documented on Geomatrix's "ESE Project Health and Safety Field Meeting Form" provided at the end of this plan. We do not anticipate that field staff will be occupationally exposed to blood or potentially infectious materials during the course of this project.

4.6 MEDICAL SURVEILLANCE

All Geomatrix project site personnel shall participate in the Geomatrix medical surveillance program, which includes annual audiometric and physical examinations for employees involved in hazardous waste or materials projects. It requires that all such personnel have medical clearance before being issued a respirator and participating in field activities. Frequency of medical examinations which complies with 29 CFR § 1910.120(f3), occurs:

1. prior to employee's first performance of field work;
2. at least once every 12 months;
3. at termination of employment;
4. upon occurrence of possible overexposure;
5. more frequently if deemed necessary by a physician.

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5.0 HAZARD ASSESSMENT

This section of the HASP identifies and describes safety and health hazards associated with site work. The purpose of characterization and job safety analysis is to identify and quantify the health and safety hazards associated with each site task and operation, and to evaluate the risks to workers. With this information, risks are then eliminated if possible, or effectively controlled.

The Job Safety Analysis identifies physical, biological, and chemical hazards for each task and/or operation performed on the project. A Job Safety Analysis must be completed by each Task Manager for their respective resource task/operation. The hazards identified for the task/operation are based on the best available knowledge of how that task/operation will be performed and the likelihood of exposure is indicated. Control measures implemented to protect employees from the hazards identified are also listed. The information provided here is designed to satisfy the job hazard analysis requirements of 1910.120(b)(4)(ii)(A) and the workplace hazard assessment requirements of 1910.132(d). A template for Job Safety Analysis reports is contained in **Appendix A**.

In addition, a “Tailgate Safety Meeting Form” (**Appendix B**) which documents daily work objectives, potential hazards, personal protective equipment, and emergency response information pertinent to specific daily work tasks is required. All Geomatrix personnel shall attend a “Tailgate Safety Meeting,” at the beginning of each daily work shift. The Task Manager is responsible for conducting the tailgate safety meeting and completing the form documenting the names of attendees.

An assessment of the potential hazards that may be encountered during field activities at the site are designated by field task in Table 1.0 and are discussed below.

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TABLE 1.0
ANTICIPATED HAZARDS

TASK	HAZARDS														
	Chemical	PHYSICAL											Biological	Explosive	General Safety
		Trip/Fall	Heavy Equipment	Underground Utilities	Overhead Power Lines	Noise	Heat Stress	Cold Stress	Sunburn	Drilling	Trench/Excavation	Confined Space	Traffic		
1. Rotosonic, cone penetrometer testing and direct push investigations;	X	X	X	X	X	X	X	X	X	X			X		X
2. Soil and groundwater sampling;	X	X	X	X	X	X	X	X	X	X			X		X
3. Monitoring well installation;	X	X	X	X	X	X	X	X	X	X			X		X
4. Sampling monitoring, agricultural, and domestic wells;	X	X				X	X	X	X				X		X
5. Soil excavation;	X	X	X	X	X	X	X	X	X		X		X		X
6. Drum assessment and possible removal;	X	X					X	X	X				X	X	X
7. Waste sampling; and	X	X					X	X	X						X
8. Wipe sampling.	X	X					X	X	X						X

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5.1 POTENTIAL CHEMICAL HAZARDS AT SITE

The site being a formal chemical facility has the potential have having a numerous potential contaminants including VOCs, SVOCs, metals, and pesticides. Based on the available, it appears that the highest concentrations of the chemicals of concern (COCs) are in the dissolved or separate phase in groundwater with relatively low concentrations in soil. Listed below, alphabetically, are some of the COCs that have been found or are suspected to be present at the site. Controls of exposure to the COCs are discussed in the following sections and will be further expanded on when the jobs safety analyses are prepared for each task. Additional information on these chemicals, including their acute effects, is included in the chemical information sheets attached at the end of this plan as Appendix C.

Hazardous Substances Known or Suspect at Site:

CAS	CHEMICAL	EXPOSURE LIMITS		LEL %	IP eV	KNOWN or EXPECTED CONCENTRATIONS	HEALTH HAZARDS
		OSHA	ACGIH				
<u>67-64-1</u>	Acetone (ppm)	1,000/12,500	500/S750	2.5	9.69	In soil ranges from 0.84 to 200 µg/kg	<i>RISE</i> ; Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis
<u>7440-38-2</u>	Arsenic -- inorganic (mg/m3)	0.01 /15	0.01			Soils: 4 to 10 mg/kg GW: Highest noted was 603 ug/l in the area of the process area and former surface impoundments.	<i>RISE</i> ; Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]
<u>71-43-2</u>	Benzene (ppm)	1/S5/1500	0.5/S2.5	1.2	9.24	Low in soils, may be high in groundwater.	<i>RISE</i> ; Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]
<u>67-66-3</u>	Chloroform (Trichloromet hane) (ppm)	C50/I500	10		11.42	Low in soils, may be high in groundwater	<i>RISE</i> ; Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]
<u>7440-47-3</u>	Chromium metal & insoluble salts (mg/m3)	1/1250	0.5			Shallow soils range from 8 to 25 mg/kg. Not detected in groundwater	<i>RISE</i> ; Irritation eyes, skin; lung fibrosis (histologic)

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CAS	CHEMICAL	EXPOSURE LIMITS		LEL %	IP eV	KNOWN or EXPECTED CONCENTRATIONS	HEALTH HAZARDS
		OSHA	ACGIH				
<u>106-46-7</u>	Dichlorobenzene, 1,4- (p-DBC, para-dichlorobenzene) (ppm)	75/1150	10	2.5	8.98	Low to medium in soils near railroad unloading area and former surface impoundments	RISE; Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]
<u>107-06-2</u>	Dichloroethane, 1,2- (Ethylene dichloride) (ppm)	50/C100/I50	10	6.2	11.05	Low concentrations in soils. Elevated concentrations up to 8,900 ug/l is perched groundwater. Concentrations up to 24,000 µg/l in Alluvial groundwater.	RISE; Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]
<u>60-57-1</u>	Dieldrin (mg/m3)	0.25/150	0.25			Low concentrations in soils across facility. Low concentrations (24ug/l) in perched zone groundwater.	<i>RISE</i> ; SKIN; Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage
<u>88-85-7</u>	Dinoseb					Present in shallow soils up to a concentration of 29,000 mg/kg. Not observed in the perched aquifer. In the alluvial aquifer, up to 54,000 µg/l.	RISE; SKIN; Blue skin, convulsions, headache, labored breathing, eye irritation, abdominal pain, vomiting, avoid exposure of pregnant woman.
<u>72-43-5</u>	Methoxychlor (mg/m3)	15/I5000	10			Low concentrations in soils. Detected in groundwater at 0.13 ug/l	<i>RISE</i> ; fasciculation, trembling, convulsions; kidney, liver damage; [potential occupational carcinogen]
<u>75-09-2</u>	Methylene chloride (Dichloromethane) (mg/m3)	25/S125/I2,300	50	13	11.32	In soils ranges up to 35 mg/kg. In perched groundwater up to 140,000 µg/l at specific locations. In alluvial groundwater at a maximum detection of 460 µg/l at specific areas.	RISE; Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]

-Exposure Limits –If not specified, exposure limit is the PEL or the TLV-TWA, Exposure limit preceded by a “S” is a Short Term Exposure Limit, by a “C” is the Ceiling Limit, and by an I is the NIOSH IDLH.

CAS – Chemical Abstracts Number

Health Hazards: Letters in italics represent exposure routes: R – Respiratory; I- Ingestion; S-Skin Absorption; & E – Eye Absorption

SKIN – Chemical represents a significant skin absorption hazard.

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5.2 POTENTIAL PHYSICAL HAZARDS AT SITE

Potential physical hazards, as those listed in Table 1.0, are discussed below.

5.2.1 Underground Utility Hazards

An underground utility check shall be performed prior to initiating any subsurface investigation or work. The check will include:

- X Arkansas One Call System (800-482-8998) Note: Arkansas One Call System must be notified at least 2 working days before any subsurface work begins. Record confirmation number in project field notes.
- X Private Locator: _____
- X Hand boring or air knifing each drilling location;
- X Plans Check (If provided by client)
- Geophysical Survey

5.2.2 Overhead Power Lines

Whenever possible, avoid working under overhead high voltage lines. The following are minimum clearances for overhead high voltage lines.

Normal Voltage (phase to phase)				Minimum Required Clearance (feet)
more than	750	-	50,000	10
more than	50,000	-	75,000	11
more than	75,000	-	125,000	13
more than	125,000	-	175,000	15
more than	250,000	-	379,000	21
more than	370,000	-	550,000	27
more than	550,000	-	1,000,000	42

(Reference: CCR Title 8, Section 2946, Table II)

5.2.3 Noise Hazards

Wear hearing protection when working near large heavy equipment, such as drill rigs or earth movers, or in other noisy conditions. As a general rule, hearing protection should be worn when two people standing within 2 feet of each other cannot communicate at normal conversational voice levels.

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5.2.4 Heat Stress Hazards

Heat stress is a major hazard, especially for workers wearing protective clothing. To avoid heat stress, drink plenty of fluids and take periodic work breaks.

The signs, symptoms, and treatment of heat stress include:

- Heat rash, which may result from exposure to heat or humid air.
- Heat cramps, which are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms and pain in the hands, feet, and abdomen. Persons experiencing these symptoms should rest in a cooler area, drink cool (not cold) liquids and gently massage cramped muscles.
- Heat exhaustion, which occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; and fainting. Persons experiencing these symptoms should lie down in a cooler area, drink cool liquids with electrolytes (Gatorade, etc.), remove any protective clothing, and cool body with wet compresses at forehead, back and neck, and/or armpits.
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma.

5.2.5 Cold Stress Hazards

Exposure to cold can cause the body's internal temperature to drop to a dangerously low level. This is called hypothermia. Exposure to temperatures below freezing can cause frostbite of hands, feet, and face.

Symptoms of hypothermia include:

- vague, slow, slurred speech
- forgetfulness, memory lapses
- inability to use hands
- frequent stumbling
- drowsiness

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To prevent hypothermia, stay dry and avoid exposure. Wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene). Keep hands and feet well protected at all times.

5.2.6 Sunburn Hazards

Skin exposure to ultraviolet radiation can result in sunburn. Use long-sleeved shirts, hats, and sunscreen to protect against sunburn.

5.2.7 Drilling Hazards

Drilling hazards include noise, heavy equipment operation, rotative/moving parts, and trip/fall hazards. Non-drilling personnel should stay away from the area around the borehole during drilling. Hard hats and safety glasses shall be worn by all personnel within 30 feet of the raised mast of an operating drill rig. All personnel will be instructed as to the location of the “kill switch” on the drill rig. During drilling, all equipment will be kept well ventilated to prevent the build-up of vapors inside the truck canopy area.

5.2.8 Trench/Excavation Hazards

OSHA requires that in all excavations, workers exposed to potential cave-ins must be protected by shoring, sloping, or benching the sides of the excavation, or placing a shield between the side of the excavation and the work area. Any excavation 4 feet deep or deeper must have adequate means of access/egress and must be tested by a competent person for oxygen deficiency or hazardous atmosphere before anyone enters. Entry into excavations/trenches 5 feet deep or deeper requires an OSHA permit and compliance with OSHA regulations for trenching and excavation.

During the work for this project, no one will enter trenches/excavations deeper than 4 feet. If soil is not inherently stable at this depth, appropriate protective measures (sloping, shoring, etc.) will be used. Care will be taken when sampling the excavation area from above to be sure the ground is stable and not undercut.

5.2.9 Confined Space

A confined space is any space a person can bodily enter that has limited egress and is not designed for continuous human occupancy. Confined spaces can pose many potential hazards including hazardous atmosphere, poor natural ventilation, engulfment, entrapment, and restricted entry for rescue purposes. All confined spaces must be considered immediately dangerous to life or health unless proven otherwise.

If entry into a confined space is required, the PHSO must be consulted and a confined space entry plan prepared and followed prior to anyone entering the space.

Confined spaces are not anticipated to be encountered on this project.

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5.2.10 Heavy Equipment

Personnel working on site in the vicinity of operating equipment should maintain safe distances from the equipment to avoid contact with moving equipment parts such as backhoe/excavator arms and buckets (be aware of swing radius), tires, tracks, etc. Be sure heavy equipment operators can see you or know where you are.

5.2.11 Traffic Hazards

Personnel will wear orange or yellow safety vests and hard hats when working near roadways, and be observant in traffic areas. Vehicles will only be operated in authorized areas by trained personnel.

5.2.12 Biohazards

None anticipated

5.2.13 Other Hazards

5.2.13.1 Slipping, Tripping and Falling

Work zone surfaces will be maintained in a neat and orderly manner to minimize the possibility of slips, trips, or falls. Materials will not be stored on the ground in foot-traffic routes. Tools and materials will not be randomly left on surfaces when not in direct use. The Site supervisor will ensure that the work areas are maintained in a neat and orderly state. When hoses or cables must be left in place for more than one work shift, such materials will be grouped, routed to minimize hazards, and covered with a ramp or bridge and/or clearly marked with hazard tape or flags.

5.2.13.2 Manual Lifting Techniques

Personnel will be trained in safe lifting techniques for all manual material handling tasks. When heavy objects, i.e., greater than 45 pounds, must be lifted manually, workers will keep the load close to the body and avoid any twisting or turning motions to minimize stress on the lower back. An adequate number of personnel or an appropriate mechanical device must be used to safely lift or handle heavy equipment.

5.2.13.3 Fire and Explosion Hazards

Despite a low potential for fire and explosion hazards, the air quality in the excavation areas will need to be monitoring for potentially explosive conditions when field personnel are working in excavation areas and with utilities (e.g. sanitary sewer piping) that could contain methane or other potentially flammable or toxic substances. Appropriate precautions must be taken to control or eliminate ignition sources at any locations where there is a fire or explosion hazard.

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5.2.13.4 Drum Sampling

The sampling of drums presents a number of hazards including chemical exposure, unknown chemicals, contents under pressure, as well as the potential physical hazards associated with the physical opening. Before any drum sampling is attempted, the situation will be assessed and a separate procedure/job safety analysis will be prepared and approved of before beginning work. It may be necessary to utilize personnel with expertise in the area.

5.3 GENERAL HAZARDS

In working with or around any hazardous or potentially hazardous substances or situations, site personnel should plan all activities before starting any task. Site personnel shall identify health and safety hazards involved with the work planned and consult with the PHSO or SSO as to how the task can be performed in the safest manner, if he/she has any uncertainties.

Common safety hazards include trip/fall hazards and those associated with working around heavy equipment. All field personnel will adhere to the following general safety rules.

1. Wear protective equipment and clothing provided, when required.
2. Wear a hard hat and safety glasses in all construction areas and during drilling activities.
3. Wear sturdy work boots or shoes at the site. Steel-toed boots are required during drilling activities.
4. Do not eat, drink, or use tobacco in restricted work areas.
5. Prevent splashing of materials containing chemicals.
6. Prevent back injury by never lifting or carrying a load that is heavier than you can comfortably handle. When lifting heavy objects, bend the knees and use the leg muscles.
7. Keep all heat sources away from combustible liquids, gases, or any flammable materials. When working in areas where combustible gases are present, use only intrinsically safe (non-sparking) equipment.
8. Field personnel shall be familiar with the physical characteristics of investigations, including:
 - wind direction in relation to restricted work areas
 - accessibility of other personnel, equipment, and vehicles
 - areas of known or suspected chemicals in soil and groundwater

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- site access
 - nearest water sources
 - location of communication devices.
9. Personnel and equipment in restricted work areas should be limited to the number necessary to perform the task at hand.
 10. All wastes generated during investigative activities at the site shall be disposed of as directed by the PM.
 11. Inspect power cords for damage such as cuts and frays. Suspend cords only with nylon rope or plastic ties.
 12. When in doubt of your safety, it is better to overprotect.
 13. Practice defensive driving.
 14. If site activities include the use of a drill rig, all on-site personnel should know the location of the “kill switch.”
 15. A first-aid kit and a fire extinguisher shall be kept at the site and/or in a field vehicle when performing field work.

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6.0 AIR MONITORING

The following air monitoring equipment will be used.

- ☒ Photoionization Detector (PID)
- ☐ Flame Ionization Detector (FID)
- ☒ Draeger Pump and Tubes (Benzene, Methylene Chloride, Vinyl Chloride)
- ☒ Combustible Gas Indicator with oxygen (CGI)
- ☐ Oxygen Meter (O₂)
- ☒ Dust (Particle) Meter

The type and frequency of air monitoring for each work task will be determined by the SSO after consultation with the PM and PHSO. Generally, however, it is anticipated that a PID will be used for regular (typically 15 minute interval) monitoring of work areas, for activities like drilling that have a potential for generating particulates or vapors. Colorimetric tubes will be used for verifying the presence of benzene, methylene chloride and vinylchloride, when sustained exceedances of action levels, and for periodic checks of the PID monitoring results. The use of dust, and CGI meters will be on an as-needed basis, depending on the activities being performed. Air monitoring instruments will be calibrated and maintained according to manufacturer's specifications. Calibration information and air monitoring results will be recorded in project field notes.

6.1 ACTION LEVELS

If organic vapors are detected in the breathing zone with the PID, the colorimetric tube samples for benzene, methylene chloride and vinylchloride will be collected. If the concentrations of these chemical are detected at concentrations at or above their respective PELs the work will stop and the situation will be assessed on the best engineering controls to be implemented. If the chemicals are not detected, the work can proceed with the following action limits.

If these activities are not effective in reducing the volatile or particulate levels, then the following protocols shall be followed for the use of respiratory protection:

- Wear respirator if PID reads greater than 5 ppm (sustained reading in the breathing zone)
- Stop work if PID reads greater than 25 ppm (sustained reading in the breathing zone)

With respect to explosion hazard, the following protocol will be followed when use of the LEL is required.

- Stop work and notify the PM or PHSO if Combustible Gas Meter reads greater than 10% LEL.

SITE HEALTH AND SAFETY PLAN

- Evacuate area and notify appropriate emergency services if Combustible Gas Meter reads greater than 25% LEL.

SITE HEALTH AND SAFETY PLAN

7.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) that will be used is specified below:

PERSONAL PROTECTIVE EQUIPMENT

Environmental Site Health & Safety Plan

Cedar Chemical Corporation Investigation and Remediation Activities

Helena-West Helena, Arkansas

PPE Required	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8
Describe Task	Rotosonic, cone penetrometer testing and direct push investigations	Soil and groundwater sampling	Monitoring well installation	Sampling monitoring , agricultural , and domestic wells	Soil excavation	Drum assessment and possible removal	Waste sampling	Wipe sampling
Steel-Toed Boots (Rubber)								
Steel-Toed Boots (Leather)	X	X	X	X	X	X	X	X
Hard Hat	X	X	X	X	X	X	X	X
Safety Glasses/Goggles	X	X	X	X	X	X	X	X
Ear Plugs	X	Av	X	X	X	Av	X	Av
Gloves Nitrile	X	X	X	X	X	X	X	X
Tyvek Coverall	Av	Av	Av	Av	Av	Av	X	X
Saranex Coverall								
Half-Face Respirator	Av	Av	Av	Av	Av	Av	X	X
Full-Face Respirator	Av	Av	Av	Av	Av	Av	X	X
Respirator Cartridge (specify type):	Comb.	Comb.	Comb.	Comb.	Comb.	Comb.	Comb.	Comb.

SITE HEALTH AND SAFETY PLAN

Orange or Yellow Safety Vests	X	X	X	X	X	X	X	X
Other (specify)								

Key:

X = PPE Required

Av = Have available at work site

Glove Types = Nitrile, Vinyl, Neoprene, Butyl

Cartridge Types = Organic Vapor (OV)

HEPA Filter (HEPA)

Combination OV and HEPA (Comb.)

Nitrile gloves shall be used when the activity carries a risk of hand contact with contaminated media, such as soil or groundwater sampling. Hard hats shall be used for activities near heavy equipment or when a bump hazard exists. Tyveks and rubber boots shall be used when the activity carries a risk of foot or body contact with contaminated media. Use of respirators is discussed above.

SITE HEALTH AND SAFETY PLAN

8.0 SITE CONTROL

The purpose of site control is to minimize the potential exposure to site hazards, to prevent vandalism at the site, and to provide adequate facilities for workers. Work area controls and decontamination areas will be provided to limit the potential for chemical exposure associated with site activities.

8.1 WORK AREA

Only authorized personnel shall be permitted access to the work areas. If necessary, this area will be cordoned with barriers, cones, or fencing to limit unauthorized access. No eating, drinking, or tobacco use are allowed in the work area.

8.2 DECONTAMINATION AREAS

Equipment and personnel decontamination areas will be set up adjacent to the work exclusion zones. All equipment and tools used during work activities shall be decontaminated in the designated decontamination area. Decontamination procedures are described in Section 9.0 of this plan.

8.3 COMMUNICATIONS

A field representative should contact the project manager or office at least once a day while in the field. The closest telephone is a personal cell phone.

SITE HEALTH AND SAFETY PLAN

9.0 DECONTAMINATION

9.1 PERSONNEL DECONTAMINATION PROCEDURES

Remove disposable gloves and clothing and place in plastic bags. Wash hands and face before eating, drinking, or smoking and at the end of the work day. Showers are available in the main building on site.

9.2 DECONTAMINATION PROCEDURES FOR EQUIPMENT/SAMPLING GEAR

Decontamination of equipment will be performed at the Site prior to sampling, between sampling intervals and following sampling to minimize potential migration of chemicals of concerns. Decontamination actions will be taken before the equipment leaves the Contamination Reduction Zone of the work site. Decontamination procedures for equipment includes:

- All equipment will be steam cleaned or washed with soap, as appropriate. Visible soil and grease will be removed by brushing or scraping.
- If a vehicle has been in contact with contaminated soil and/or groundwater, its wheels need to be cleaned prior to exiting the Site.

9.3 STORAGE OF INVESTIGATION-DERIVED MATERIALS

Investigation-derived materials (PPE/expendables, decon waste, soil cuttings, purged groundwater, etc.) will be handled and stored as follows:

Disposable materials will be placed in large plastic trash bags (double-bagged) and stored in 55-gallon drums on-Site.

SITE HEALTH AND SAFETY PLAN

10.0 EMERGENCY RESPONSE

In the event of an accident or emergency condition, the procedures specified below shall be followed.

10.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used.

1. Remove injured or exposed person(s) from immediate danger if possible.
2. Evacuate other on-site personnel to a safe place in an upwind direction until it is safe for work to resume.
3. If serious injury or life-threatening condition exists, call

911 - Paramedics, fire department, police
Hospital emergency room

Clearly describe location, injury and conditions to dispatcher/hospital. Designate a person to direct emergency equipment to the injured person(s).

4. Provide first aid if necessary. Remove contaminated clothing only if this can be done without endangering the injured person.
5. Call the project manager and/or project health and safety officer.
6. Immediately implement steps to prevent recurrence of the accident.

A map showing the nearest hospital location is provided in Appendix D.

Hospital Helena Regional Medical Center
Address 1801 Martin Luther King Jr. Dr.
Helena, Arkansas
Telephone (870) 338-5800

Telephone number of nearest Poison Control Center: (800) 222-1222

Other emergency notifications and phone numbers:

SITE HEALTH AND SAFETY PLAN

10.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

1. Evacuate all on-site personnel to a safe place in an upwind direction until the PM or PHSO determines that it is safe for work to resume.
2. Immediately instruct a designated person to contact the PM or PHSO.
3. Contain spill, if it is possible and it can be done safely.
4. Initiate cleanup.

10.3 GENERAL EMERGENCIES

In the case of fire, flood, explosion, or other hazard, work shall be halted and the local police/fire department shall be notified by calling 911. All on-site personnel will be immediately evacuated to a safe place.

SITE HEALTH AND SAFETY PLAN

11.0 APPROVALS

Project Manager

Date

Project Health & Safety Officer

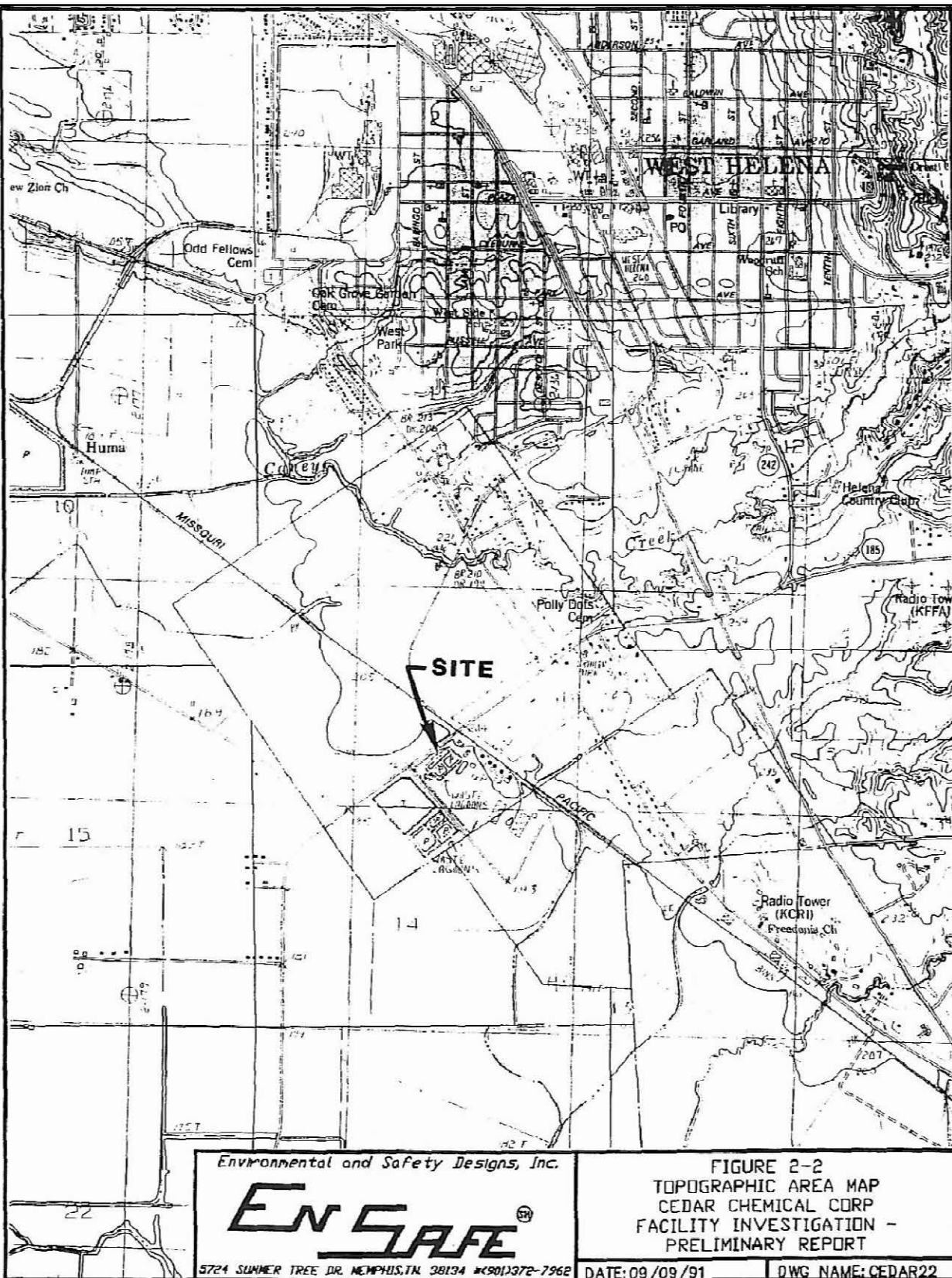
Date

Site Safety Officer

Date

Figures

Site Location Map



SOURCE: EnSafe, Phase II Investigation Report, 1995



SITE LOCATION MAP

Cedar Chemical
Helena-West Helena, Arkansas



Geomatrix

Project 13636

Figure 1

SITE HEALTH AND SAFETY PLAN

APPENDIX A

Job Safety Analysis Forms

Geomatrix JSAs

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08	
Task:	Concrete Cutting	Task Location:	Inside Drum Vault Warehouse			
For this Project and Task, this document is a Certification of Hazard Assessment						
Completed by:	D. Kubik	Reviewed by:	K. Beck			
Notes:						
Task	Hazard	Risk Control Method				
Set Up Work Site	Uneven or unstable ground	<input type="checkbox"/> Visually examine site prior to entry. <input type="checkbox"/> .				
	Risk of being struck by vehicles	<input type="checkbox"/> Designate areas on site where vehicle traffic is permitted <input type="checkbox"/> Wear high-visibility safety vests in traffic areas				
	Lifting injuries	<input type="checkbox"/> Use proper technique when lifting equipment – lift with you legs, not your back <input type="checkbox"/> Make sure you have a good footing when lifting heavy objects				
Concrete Cutting	Ignition sources / fire & explosion	<input type="checkbox"/> Ensure electrical equipment properly grounded and fitted with earth leakage device. Use non-electrical coring equipment where possible <input type="checkbox"/> Apply water as necessary to address surface sparking potential <input type="checkbox"/> Area to be deemed free of explosive conditions prior to work <input type="checkbox"/> Ensure area is wetted at all times, including bit				
		Hearing damage due to high noise levels	<input type="checkbox"/> Wear appropriate hearing protection (ear muffs or ear plugs)			
		Dust Generation	<input type="checkbox"/> Use wet method of cutting			
	Slip, trip and fall hazards	<input type="checkbox"/> Maintain good house keeping <input type="checkbox"/> Keep unauthorized people away from work area <input type="checkbox"/> Vacuum up or contain generated waste water immediately				
	Foot injuries	<input type="checkbox"/> Wear steel toed boots				
	Hand injuries	<input type="checkbox"/> Wear appropriate gloves <input type="checkbox"/> Use correct tools when cutting and removing cut concrete				

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	03/17/08
Task:	CPT, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
Set Up Work Site	Auto / public traffic	<input type="checkbox"/> Notify attendant or site manager / owner of work activities and location. <input type="checkbox"/> Work location to be barricaded off; vehicle and pedestrian traffic management plan as required <input type="checkbox"/> High visible clothing, steel cap boots, long sleeves/pants/ hard hat / safety glasses to be worn at all times while in operational areas <input type="checkbox"/> Inspect area around vehicle prior to putting vehicle in motion and use spotter			
	Uneven or unstable ground	<input type="checkbox"/> Visually examine site prior to entry. <input type="checkbox"/> Place timbers under outriggers or supports to spread load			
	Overhead power lines	<input type="checkbox"/> Look overhead prior to moving rig or raising mast. Mast must be 12 feet away from power lines or as required by local power authority. <input type="checkbox"/> Electrical spotter to be employed when working within 10 to 20 feet of the lines; power company permit also required			
	Underground services	<input type="checkbox"/> Call local one call service (811) 48-working hours prior to start of work <input type="checkbox"/> Underground services to be located prior to breaking ground by qualified service locator <input type="checkbox"/> If available, check as built plans <input type="checkbox"/> Visually inspect site for signs of underground encumbrances			
	Vegetation fires	<input type="checkbox"/> Remove vegetation from areas where vehicles will be parked and idling <input type="checkbox"/> Fire extinguisher in good working order required to be at job site at all times			
	Wind blown dust	<input type="checkbox"/> Minimize dust from drilling by use of covers / shields or water when possible. Wear protective glasses or goggles as required.			
	Risk of being struck by vehicles	<input type="checkbox"/> Rigs and heavy equipment shall be equipped with functioning backup alarms and lights <input type="checkbox"/> Prior to approaching vehicle, make sure that you make eye contact with the vehicle operator <input type="checkbox"/> Designate areas on site where vehicle traffic is permitted <input type="checkbox"/> Wear high-visibility safety vests in traffic areas			
Rig Set-Up	Rig roll over	<input type="checkbox"/> Cross all hills and obstructions head on <input type="checkbox"/> Set jack or out-riggers prior to operation <input type="checkbox"/> Check for unstable soil – assess soil by qualified professional engineer if required.			
	Contact with electric lines and other overhead obstacles	<input type="checkbox"/> Position rig to avoid overhead utility lines by distance defined by voltage and local regulations <input type="checkbox"/> Use spotter when raising mast to confirm clearance of overhead lines and other obstructions			
	Injury by moving rig / vehicles	<input type="checkbox"/> Heavy equipment shall be equipped with back-up alarms			
	Chemicals of Concern Containment	<input type="checkbox"/> Set-up adequate exclusions to keep unauthorized personnel away from work area			
Borehole Advancement	Faulty or inappropriate equipment	<input type="checkbox"/> Qualified driller must inspect rig prior to use. Faulty or inappropriate, equipment shall be put out of service and			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	03/17/08
Task:	CPT, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					

Task	Hazard	Risk Control Method
		replaced / repaired <input type="checkbox"/> Inspect all hand tools prior to use. If faulty or inappropriate, do not use until repaired or replaced
	Moving / rotating equipment	<input type="checkbox"/> All appropriate guarding to be in place prior to use <input type="checkbox"/> Only trained operators will be near operation area of rig while downhole equipment are being advanced or extracted. <input type="checkbox"/> Stay clear of rotating and/or moving equipment – no hands, feet, any body part, or loose clothing to be near rotating equipment. Equipment shall be stopped for sampling, etc. <input type="checkbox"/> Wear appropriate PPE including leather gloves, steel capped boots, hard hat (not needed inside CPT rig), and safety glasses. Full length overalls or long sleeve shirt and long pants - no loose clothing, fire retardant clothing (FRC) when appropriate.
	Impact by suspended loads	<input type="checkbox"/> Do not walk under suspended loads
	Hearing damage from high noise levels	<input type="checkbox"/> USE HEARING PROTECTION (EAR MUFFS OR EAR PLUGS) IF NOISE > 85 db
	Vapors and airborne particulates	<input type="checkbox"/> Monitor air concentrations using photoionization detector, combustible gas indicator, etc. <input type="checkbox"/> Stop work if hazardous conditions identified (explosive atmosphere, oxygen deficient or enriched atmosphere) – reassess and take the necessary precautions. <input type="checkbox"/> Wear appropriate PPE including face shield / safety glasses, dust masks or respirators, long sleeve shirts and pants, FRC when appropriate.
	Slip, trip & fall	<input type="checkbox"/> Keep work area tidy and clean – including the removal of excess cuttings. <input type="checkbox"/> Keep work surfaces dry where possible <input type="checkbox"/> Use hand rail when entering and exiting the rig <input type="checkbox"/> Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces <input type="checkbox"/> Stay aware of footing and do not run
	Heat / cold stress	<input type="checkbox"/> Take regular breaks on hot days or if feeling faint or overexerted <input type="checkbox"/> Consume adequate food / beverages (water / sports drink) <input type="checkbox"/> If possible, adjust work schedule to avoid temperature extremes
	Biological hazards: insects, snakes, wildlife, vegetation	<input type="checkbox"/> Carefully inspect work area during site inspection to identify hazards <input type="checkbox"/> Use insect repellent <input type="checkbox"/> Open enclosures slowly <input type="checkbox"/> Survey site for presence of biological hazards and maintain safe distance <input type="checkbox"/> Wear appropriate PPE including leather gloves, long sleeves and pants and snake chaps as required
	Underground services	<input type="checkbox"/> Professional cable locator to locate and identify all services in potential drilling area. <input type="checkbox"/> All soil borings to be either hand augered or air-knifed for at least the first 6 feet to clear any underground services.
	Working at heights	<input type="checkbox"/> No work to be conducted on rig at heights greater than 6 feet

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	03/17/08
Task:	CPT, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
		without fall restraint / arrest safety equipment.			
	UV exposure	<input type="checkbox"/> Wear correct PPE (neck to toe clothing, brimmed hard hat, & sun block)			
	Wind blown dust	<input type="checkbox"/> Minimize dust from drilling by use of covers / shields or water when possible. Wear protective glasses or goggles as required.			
	Leakage of fuel oil and hydraulic fluid	<input type="checkbox"/> Have ready access to spill absorbent materials to soak up any spilled hydrocarbons			
	Lifting heavy equipment	<input type="checkbox"/> Do not lift or move heavy equipment without assistance <input type="checkbox"/> Use proper bending / lifting techniques by lifting with arms and legs and not with back. Keep back straight while lifting <input type="checkbox"/> If possible, use powered lift truck, drum cart, or other mechanical means <input type="checkbox"/> Take breaks if feeling faint or over exerted			
	Muscle strain injury	<input type="checkbox"/> Use correct manual lifting methods. <input type="checkbox"/> Wear correct PPE.			
Any Chemical Use	Injury or adverse effects from chemical exposure	<input type="checkbox"/> All chemicals to be properly stored & labeled <input type="checkbox"/> Current MSDS to be available for each chemical on-site <input type="checkbox"/> Wear appropriate PPE <input type="checkbox"/> Employees trained on chemical handling			
Soil Sampling	Handling contaminated materials / soils / groundwater	<input type="checkbox"/> Wear appropriate PPE including nitrile gloves, safety glasses and neck to toe clothing.			
	Sharp sampling tools	<input type="checkbox"/> Use correct tools for opening split spoon sampler / push tubes			
	Vapors	<input type="checkbox"/> Wear appropriate PPE including respirator if required <input type="checkbox"/> Work upwind of sampling area if possible			
Groundwater Sampling	Exposure to preservative chemicals in sample bottles	<input type="checkbox"/> Wear nitrile gloves and safety glasses when handling bottles <input type="checkbox"/> Inspect bottles prior to use			
	Cuts from broken bottles	<input type="checkbox"/> Wear protective gloves when removing broken bottles			
	Splashes of groundwater (peristaltic pump)	<input type="checkbox"/> Make sure all connections are secure <input type="checkbox"/> Start pump at a low flow rate <input type="checkbox"/> Only start pump when collection end of tube is in collection container <input type="checkbox"/> Monitor sample collection to assures that bottles are not over filled <input type="checkbox"/> Wear nitrile gloves and safety glasses			
	Splashes of groundwater (bailer)	<input type="checkbox"/> Carefully place and remove bailer so as not to splash groundwater from bailer or string <input type="checkbox"/> Monitor sample collection to assures that bottles are not over filled <input type="checkbox"/> Wear nitrile gloves and safety glasses			
	Slips, trips and falls	<input type="checkbox"/> Maintain good housekeeping procedurs <input type="checkbox"/> Clean up any spill as soon after the occurance as possible <input type="checkbox"/> Watch where you are walking			
	Electrical shock	<input type="checkbox"/> Make sure that outlets are fitted with ground fault circuit interrupters			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	03/17/08
Task:	CPT, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
		<input type="checkbox"/> If not designed to be used in or with water, keep electrical equipment away from water sources.			
	Lifting injuries	<input type="checkbox"/> Use proper technique when lifting coolers with samples -- lift with you legs, not your back <input type="checkbox"/> Do not overload coolers <input type="checkbox"/> Use 2 person lift techniques when handing heavy coolers <input type="checkbox"/> Make sure handles are secure and in good working order before lifting. <input type="checkbox"/> Make sure you have a good footing when lifting heavy objects			
Grouting borehole	Exposure to grout	<input type="checkbox"/> Mix grout in appropriate containers <input type="checkbox"/> If using a pump to mix grout, assures all connection are secure <input type="checkbox"/> Wear safety glasses and gloves when mixing and using grout			
	Lifting injuries	<input type="checkbox"/> Use proper technique when lifting bags or containers of grout -- lift with you legs, not your back <input type="checkbox"/> Use mechanical devices as needed <input type="checkbox"/> Make sure you have a good footing when lifting heavy objects			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17.08
Task:	Direct Push, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
Set Up Work Site	Uneven or unstable ground	<input type="checkbox"/> Visually examine site prior to entry. <input type="checkbox"/> Place timbers under outriggers or supports to spread load			
	Overhead power lines	<input type="checkbox"/> Look overhead prior to moving rig or raising mast. Mast must be 12 feet away from power lines or as required by local power authority. <input type="checkbox"/> Electrical spotter to be employed when working within 10 to 20 feet of the lines; power company permit also required			
	Underground services	<input type="checkbox"/> Call local one call service (811) 48-working hours prior to start of work <input type="checkbox"/> Underground services to be located prior to breaking ground by qualified service locator <input type="checkbox"/> If available, check as built plans <input type="checkbox"/> Visually inspect site for signs of underground encumbrances			
	Vegetation fires	<input type="checkbox"/> Remove vegetation from areas where vehicles will be parked and idling <input type="checkbox"/> Fire extinguisher in good working order required to be at job site at all times			
	Wind blown dust	<input type="checkbox"/> Minimize dust from drilling by use of covers / shields or water when possible. Wear protective glasses or goggles as required.			
	Risk of being struck by vehicles	<input type="checkbox"/> Rigs and heavy equipment shall be equipped with functioning backup alarms and lights <input type="checkbox"/> Prior to approaching vehicle, make sure that you make eye contact with the vehicle operator <input type="checkbox"/> Designate areas on site where vehicle traffic is permitted <input type="checkbox"/> Wear high-visibility safety vests in traffic areas			
Rig Set-Up	Rig roll over	<input type="checkbox"/> Cross all hills and obstructions head on <input type="checkbox"/> Set jack or out-riggers prior to operation <input type="checkbox"/> Check for unstable soil – assess soil by qualified professional engineer if required.			
	Contact with electric lines and other overhead obstacles	<input type="checkbox"/> Position rig to avoid overhead utility lines by distance defined by voltage and local regulations <input type="checkbox"/> Use spotter when raising mast to confirm clearance of overhead lines and other obstructions			
	Injury by moving rig / vehicles	<input type="checkbox"/> Heavy equipment shall be equipped with back-up alarms			
	Chemicals of Concern Containment	<input type="checkbox"/> Set-up adequate exclusions to keep unauthorized personnel away from work area			
Borehole Advancement	Faulty or inappropriate equipment	<input type="checkbox"/> Qualified driller must inspect rig prior to use. Faulty or inappropriate, equipment shall be put out of service and replaced / repaired <input type="checkbox"/> Inspect all hand tools prior to use. If faulty or inappropriate, do not use until repaired or replaced			
	Moving / rotating equipment	<input type="checkbox"/> All appropriate guarding to be in place prior to use <input type="checkbox"/> Only trained operators will be near operation area of rig while downhole equipment are being advanced or extracted. <input type="checkbox"/> Stay clear of rotating and/or moving equipment – no hands, feet, any body part, or loose clothing to be near rotating			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17.08
Task:	Direct Push, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		

For this Project and Task, this document is a Certification of Hazard Assessment

Completed by:	D. Kubik	Reviewed by:	K. Beck
Notes:			

Task	Hazard	Risk Control Method
		<p>equipment. Equipment shall be stopped for sampling, etc.</p> <p><input type="checkbox"/> Wear appropriate PPE including leather gloves, steel capped boots, hard hat (not needed inside CPT rig), and safety glasses. Full length overalls or long sleeve shirt and long pants - no loose clothing, fire retardant clothing (FRC) when appropriate.</p>
	Impact by suspended loads	<input type="checkbox"/> Do not walk under suspended loads
	Hearing damage from high noise levels	<input type="checkbox"/> USE HEARING PROTECTION (EAR MUFFS OR EAR PLUGS) IF NOISE > 85 db
	Vapors and airborne particulates	<p><input type="checkbox"/> Monitor air concentrations using photoionization detector, combustible gas indicator, etc.</p> <p><input type="checkbox"/> Stop work if hazardous conditions identified (explosive atmosphere, oxygen deficient or enriched atmosphere) – reassess and take the necessary precautions.</p> <p><input type="checkbox"/> Wear appropriate PPE including face shield / safety glasses, dust masks or respirators, long sleeve shirts and pants, FRC when appropriate.</p>
	Slip, trip & fall	<p><input type="checkbox"/> Keep work area tidy and clean – including the removal of excess cuttings.</p> <p><input type="checkbox"/> Keep work surfaces dry where possible</p> <p><input type="checkbox"/> Use hand rail when entering and exiting the rig</p> <p><input type="checkbox"/> Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces</p> <p><input type="checkbox"/> Stay aware of footing and do not run</p>
	Heat / cold stress	<p><input type="checkbox"/> Take regular breaks on hot days or if feeling faint or overexerted</p> <p><input type="checkbox"/> Consume adequate food / beverages (water / sports drink)</p> <p><input type="checkbox"/> If possible, adjust work schedule to avoid temperature extremes</p>
	Biological hazards: insects, snakes, wildlife, vegetation	<p><input type="checkbox"/> Carefully inspect work area during site inspection to identify hazards</p> <p><input type="checkbox"/> Use insect repellent</p> <p><input type="checkbox"/> Open enclosures slowly</p> <p><input type="checkbox"/> Survey site for presence of biological hazards and maintain safe distance</p> <p><input type="checkbox"/> Wear appropriate PPE including leather gloves, long sleeves and pants and snake chaps as required</p>
	Underground services	<p><input type="checkbox"/> Professional cable locator to locate and identify all services in potential drilling area.</p> <p><input type="checkbox"/> All soil borings to be either hand augered or air-knifed for at least the first 6 feet to clear any underground services.</p>
	Working at heights	<input type="checkbox"/> No work to be conducted on rig at heights greater than 6 feet without fall restraint / arrest safety equipment.
	UV exposure	<input type="checkbox"/> Wear correct PPE (neck to toe clothing, brimmed hard hat, & sun block)
	Wind blown dust	<input type="checkbox"/> Minimize dust from drilling by use of covers / shields or water when possible. Wear protective glasses or goggles as required.
	Leakage of fuel oil and	<input type="checkbox"/> Have ready access to spill absorbent materials to soak up any

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17.08
Task:	Direct Push, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
	hydraulic fluid	spilled hydrocarbons			
	Lifting heavy equipment	<input type="checkbox"/> Do not lift or move heavy equipment without assistance <input type="checkbox"/> Use proper bending / lifting techniques by lifting with arms and legs and not with back. Keep back straight while lifting <input type="checkbox"/> If possible, use powered lift truck, drum cart, or other mechanical means <input type="checkbox"/> Take breaks if feeling faint or over exerted			
	Muscle strain injury	<input type="checkbox"/> Use correct manual lifting methods. <input type="checkbox"/> Wear correct PPE.			
Any Chemical Use	Injury or adverse effects from chemical exposure	<input type="checkbox"/> All chemicals to be properly stored & labeled <input type="checkbox"/> Current MSDS to be available for each chemical on-site <input type="checkbox"/> Wear appropriate PPE <input type="checkbox"/> Employees trained on chemical handling			
Soil Sampling	Handling contaminated materials / soils / groundwater	<input type="checkbox"/> Wear appropriate PPE including nitrile gloves, safety glasses and neck to toe clothing.			
	Sharp sampling tools	<input type="checkbox"/> Use correct tools for opening split spoon sampler / push tubes			
	Vapors	<input type="checkbox"/> Wear appropriate PPE including respirator if required <input type="checkbox"/> Work upwind of sampling area if possible			
Groundwater Sampling	Exposure to preservative chemicals in sample bottles	<input type="checkbox"/> Wear nitrile gloves and safety glasses when handling bottles <input type="checkbox"/> Inspect bottles prior to use			
	Cuts from broken bottles	<input type="checkbox"/> Wear protective gloves when removing broken bottles			
	Splashes of groundwater (peristaltic pump)	<input type="checkbox"/> Make sure all connections are secure <input type="checkbox"/> Start pump at a low flow rate <input type="checkbox"/> Only start pump when collection end of tube is in collection container <input type="checkbox"/> Monitor sample collection to assures that bottles are not over filled <input type="checkbox"/> Wear nitrile gloves and safety glasses			
	Splashes of groundwater (bailer)	<input type="checkbox"/> Carefully place and remove bailer so as not to splash groundwater from bailer or string <input type="checkbox"/> Monitor sample collection to assures that bottles are not over filled <input type="checkbox"/> Wear nitrile gloves and safety glasses			
	Slips, trips and falls	<input type="checkbox"/> Maintain good housekeeping procedurs <input type="checkbox"/> Clean up any spill as soon after the occurance as possible <input type="checkbox"/> Watch where you are walking			
	Electrical shock	<input type="checkbox"/> Make sure that outlets are fitted with ground fault circuit interrupters <input type="checkbox"/> If not designed to be used in or with water, keep electrical equipment away from water sources.			
	Lifting injuries	<input type="checkbox"/> Use proper technique when lifting coolers with samples -- lift with you legs, not your back <input type="checkbox"/> Do not overload coolers			

JOB SAFETY ANALYSIS

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17.08
Task:	Direct Push, Soil and GW Sampling, Grouting	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
		<input type="checkbox"/> Use 2 person lift techniques when handing heavy coolers <input type="checkbox"/> Make sure handles are secure and in good working order before lifting. <input type="checkbox"/> Make sure you have a good footing when lifting heavy objects			
Grouting borehole	Exposure to grout	<input type="checkbox"/> Mix grout in appropriate containers <input type="checkbox"/> If using a pump to mix grout, assures all connection are secure <input type="checkbox"/> Wear safety glasses and gloves when mixing and using grout			
	Lifting injuries	<input type="checkbox"/> Use proper technique when lifting bags or containers of grout -- lift with you legs, not your back <input type="checkbox"/> Use mechanical devices as needed <input type="checkbox"/> Make sure you have a good footing when lifting heavy objects			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Drilling, Soil/GW Sampling, Monitoring Well Installation	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
Set Up Work Site	Auto / public traffic	<input type="checkbox"/> Notify attendant or site manager / owner of work activities and location. <input type="checkbox"/> Work location to be barricaded off; vehicle and pedestrian traffic management plan as required <input type="checkbox"/> High visible clothing, steel cap boots, long sleeves/pants/ hard hat / safety glasses to be worn at all times while in operational areas <input type="checkbox"/> Inspect area around vehicle prior to putting vehicle in motion and use spotter			
	Uneven or unstable ground	<input type="checkbox"/> Visually examine site prior to entry. <input type="checkbox"/> Place timbers under outriggers to spread load.			
	Overhead power lines	<input type="checkbox"/> Look overhead prior moving rig or raising mast. Mast must be 12 feet away from power lines or as required by local power authority. <input type="checkbox"/> Electrical spotter to be employed when working within 10 to 20 feet of the lines; power company permit also required			
	Underground services	<input type="checkbox"/> Call the local one call service (811) according to local regulations prior to breaking the ground surface. <input type="checkbox"/> Physically assess the site for the indication of underground utilities based on surface observations. <input type="checkbox"/> Use a professional utility locator to locate and identify all services in potential drilling area. <input type="checkbox"/> Review any available "as built" plans which show underground utilities. <input type="checkbox"/> All soil borings to be either hand augered or air-knifed for the first 5 feet to clear any underground services.			
Drill Rig Set-Up	Rig roll over	<input type="checkbox"/> Do not move rig with raised mast <input type="checkbox"/> Set jack or out-riggers prior to raising mast <input type="checkbox"/> Check for unstable soil – assess soil by qualified professional engineer if required.			
	Contact with electric lines and other overhead obstacles	<input type="checkbox"/> Position rig to avoid overhead utility lines by distance defined by voltage and local regulations <input type="checkbox"/> Use spotter when raising mast to confirm clearance of overhead lines and other obstructions			
	Injury by moving rig / vehicles	<input type="checkbox"/> Heavy equipment shall be equipped with back-up alarms			
Soil Boring / Drilling	Faulty or inappropriate equipment	<input type="checkbox"/> Qualified driller must inspect rig prior to use. Faulty or inappropriate, equipment shall be put out of service and replaced / repaired <input type="checkbox"/> Inspect all hand tools prior to use. If faulty or inappropriate, do not use until repaired or replaced			
	Moving / rotating equipment	<input type="checkbox"/> All appropriate guarding to be in place prior to use <input type="checkbox"/> Set-up adequate exclusion zone – only trained, inducted and			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Drilling, Soil/GW Sampling, Monitoring Well Installation	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
		<p>authorized personnel within this area</p> <ul style="list-style-type: none"> <input type="checkbox"/> Verify that all kill switches are operational and that all field personnel know the location of these switches. <input type="checkbox"/> Stay clear of rotating auger / equipment – no hands, feet or any body part to be near rotating equipment. Rotation to stop for sampling etc. <input type="checkbox"/> Use long handled shovels to clear away cuttings when auger has stopped, however it is best to only shovel cuttings with augers are not rotating. <input type="checkbox"/> Wear appropriate PPE including leather gloves, steel capped boots, hard hat, and safety glasses. Full length overalls or long sleeve shirt and long pants - no loose clothing, fire retardant clothing (FRC) when appropriate. 			
	Impact by suspended loads	<input type="checkbox"/> Do not walk under suspended loads			
	Hearing damage from high noise levels	<input type="checkbox"/> Use hearing protection (ear muffs or ea plugs) If noise > 85 db			
	Vapors and airborne particulates	<ul style="list-style-type: none"> <input type="checkbox"/> Monitor air concentration using PID, CIG, etc. <input type="checkbox"/> Stop work if hazardous conditions identified (explosive atmosphere, oxygen deficient or enriched atmosphere) – reassess and take the necessary precautions. <input type="checkbox"/> Wear appropriate PPE including face shield / safety glasses, dust masks or respirators, long sleeve shirts and pants, FRC when appropriate. 			
	Slip, trip & fall	<ul style="list-style-type: none"> <input type="checkbox"/> Keep work area tidy and clean – including the removal of excess cuttings. <input type="checkbox"/> Keep work surfaces dry where possible <input type="checkbox"/> Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces <input type="checkbox"/> Stay aware of footing and do not run 			
	Heat / cold stress	<ul style="list-style-type: none"> <input type="checkbox"/> Take regular breaks on hot days or if feeling faint or overexerted <input type="checkbox"/> Consume adequate food / beverages (water / sports drink) <input type="checkbox"/> If possible, adjust work schedule to avoid temperature extremes 			
	Biological hazards: insects, snakes, wildlife, vegetation	<ul style="list-style-type: none"> <input type="checkbox"/> Carefully inspect work area during site inspection to identify hazards <input type="checkbox"/> Use insect repellant <input type="checkbox"/> Open enclosures slowly <input type="checkbox"/> Survey site for presence of biological hazards and maintain safe distance <input type="checkbox"/> Wear appropriate PPE including leather gloves, long sleeves and pants and snake chaps as required 			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Drilling, Soil/GW Sampling, Monitoring Well Installation	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
	Underground services	<input type="checkbox"/> Call the local one call service (811) according to local regulations prior to breaking the ground surface. <input type="checkbox"/> Physically assess the site for the indication of underground utilities based on surface observations. <input type="checkbox"/> Use a professional utility locator to locate and identify all services in potential drilling area. <input type="checkbox"/> Review any available "as built" plans which show underground utilities. <input type="checkbox"/> All soil borings to be either hand augered or air-knifed for the first 5 feet to clear any underground services.			
	Working at heights	<input type="checkbox"/> No work to be conducted on rig at heights greater than 6 feet without fall restraint / arrest safety equipment.			
	UV exposure	<input type="checkbox"/> Wear correct PPE (neck to toe clothing & sun block)			
	Wind blown dust	<input type="checkbox"/> Minimize dust from drilling by use of covers / shields or water when possible. Wear protective glasses or goggles as required.			
	Leakage of fuel oil and hydraulic fluid	<input type="checkbox"/> Have ready access to spill absorbent materials to soak up any spilled hydrocarbons			
	Lifting heavy equipment	<input type="checkbox"/> Do not lift or move heavy equipment without assistance <input type="checkbox"/> Use proper bending / lifting techniques by lifting with arms and legs and not with back. Keep back straight while lifting <input type="checkbox"/> If possible, use powered lift truck, drum cart, or other mechanical means <input type="checkbox"/> Take breaks if feeling faint or over exerted			
	Muscle strain injury	<input type="checkbox"/> Use correct manual lifting methods. <input type="checkbox"/> Wear correct PPE.			
	Entanglement with rotating drilling rods and associated equipment	<input type="checkbox"/> Stand clear of rotating equipment. <input type="checkbox"/> No loose clothing to be worn. <input type="checkbox"/> Driller to manage soil sampling.			
Soil Sampling	Handling contaminated materials / soils / groundwater	<input type="checkbox"/> Wear appropriate PPE including nitrile gloves, safety glasses and neck to toe clothing.			
	Sharp sampling tools	<input type="checkbox"/> Use correct tools for opening split spoon sampler / push tubes			
	Vapors	<input type="checkbox"/> Wear appropriate PPE including respirator if required <input type="checkbox"/> Work upwind of sampling area if possible			
Any Chemical Use	Injury or adverse effects from chemical exposure	<input type="checkbox"/> All chemicals to be properly stored & labeled <input type="checkbox"/> Current MSDS to be available for each chemical on-site <input type="checkbox"/> Wear appropriate PPE <input type="checkbox"/> Employees trained on chemical handling			
Monitoring well installation	Lifting heavy materials	<input type="checkbox"/> Do not lift or move heavy equipment without assistance			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Drilling, Soil/GW Sampling, Monitoring Well Installation	Task Location:	Facility Wide and Offsite		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
		<input type="checkbox"/> Use proper bending / lifting techniques by lifting with arms and legs and not with back. Keep back straight while lifting <input type="checkbox"/> If possible, use powered lift truck, drum cart, or other mechanical means <input type="checkbox"/> Take breaks if feeling faint or over exerted <input type="checkbox"/> Use correct manual lifting methods. <input type="checkbox"/> Wear correct PPE.			
	Pinch points	<input type="checkbox"/> Watch for pinch points when assembling and installing well pieces			
	Slip, trip & fall	<input type="checkbox"/> Keep work area tidy and clean – including the removal of excess cuttings. <input type="checkbox"/> Keep work surfaces dry where possible <input type="checkbox"/> Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Investigation Derived Waste Management (drums)	Task Location:	Waste Management Area		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
Loading Soil Cuttings	Back Strain	<input type="checkbox"/> Use proper techniques when shoveling cuttings into drum			
Loading Waste Water	Liquid Splashes	<input type="checkbox"/> Wear safety glasses or goggles			
		<input type="checkbox"/> Use a funnel			
		<input type="checkbox"/> Make sure hose is securely in drum before pumping			
Opening and Closing Drum with Bung Wrench					
Removing bung cap with bung wrench	Hand and finger injury.	<input type="checkbox"/> Ensure bung wrench is properly engaged before twisting			
	Injuries from pressurized drums.	<input type="checkbox"/> Do not open bulging drums. <input type="checkbox"/> Do not lean directly over the drum while opening			
Opening and Closing and Open-head Drum					
Using a speed wrench to remove closure bolt	Hand injuries.	<input type="checkbox"/> Ensure wrench is properly positioned on bolt head.			
	Injuries from pressurized drums.	<input type="checkbox"/> Do not open bulging drums. <input type="checkbox"/> Do not lean directly over the drum while opening			
Remove lid ring.	Hand and finger injury (pinches/cuts).	<input type="checkbox"/> Wear heavy gloves.			
Closing Drum is reverse of previous 2 tasks	Hand injuries.	<input type="checkbox"/> Ensure wrench is properly positioned on bolt head.			
	Hand and finger injury (pinches/cuts).	<input type="checkbox"/> Wear heavy gloves.			
Drum Moving by Hand					
Tilting it toward you about 30° after ensuring that the drum is closed	Back or muscle strain	<input type="checkbox"/> Clear path before moving the drum. <input type="checkbox"/> Do not wear loose clothing. <input type="checkbox"/> Test weight of the drum before tilting. <input type="checkbox"/> Brace feet apart, one against the drum's base and the other behind you. <input type="checkbox"/> Use your weight, rather than your muscles, to tilt the drum. Do not jerk the drum.			
	Abrasions from sharp edges or burs.	<input type="checkbox"/> Wear heavy gloves.			
Rolling the drum on the edge of the base	Back or muscle strain	<input type="checkbox"/> Maintain control of the drum. <input type="checkbox"/> Roll the drum slowly. <input type="checkbox"/> Do not cross legs. Take side steps			
	Foot injury.	<input type="checkbox"/> Wear safety boots with toe protection. <input type="checkbox"/> Keep feet clear of drum.			
Releasing the drum.	Hand and finger injury.	<input type="checkbox"/> Wear heavy gloves. <input type="checkbox"/> Do not allow hand to be pinched between other drums or objects.			
	Back or muscle strain.	<input type="checkbox"/> Maintain control of drum. <input type="checkbox"/> Release the drum slowly			

Project Name:	Cedar Chemical Company	Project No:	013636	Date:	3-17-08
Task:	Investigation Derived Waste Management (drums)	Task Location:	Waste Management Area		
For this Project and Task, this document is a Certification of Hazard Assessment					
Completed by:	D. Kubik	Reviewed by:	K. Beck		
Notes:					
Task	Hazard	Risk Control Method			
	Foot injury	<input type="checkbox"/> Wear safety boots with toe protection. <input type="checkbox"/> Keep feet clear of drum.			
Moving Drums with a Drum Dolly					
Pushing the dolly up to the drum and position the dolly's feet at the drum's base.	Tripping or falling.	<input type="checkbox"/> Ensure that the drum is fully closed. <input type="checkbox"/> Clear path in front of the moving dolly. <input type="checkbox"/> Be aware of other workers in the area.).			
Tipping the dolly forward and engaging dolly-drum-lock.	Hand and finger injuries.	<input type="checkbox"/> Make sure the lock is properly engaged. <input type="checkbox"/> Hold the dolly in position with left hand; engage the lock with right hand. (Reverse if left-handed).			
Pulling the dolly and the drum back until the dolly rests on the wheels.	Back strain.	<input type="checkbox"/> Use a single, smooth pulling motion. <input type="checkbox"/> Get assistance if available			
Releasing drum is reverse of previous 3 tasks	See hazards above	<input type="checkbox"/> See controls above			

Subcontractor JSAs

Sonic Drilling

SONIC DRILL
Job Safety Analysis
(JSA)

BOART LONGYEAR
Environmental & Infrastructure Drilling Services

Revised 1-2006

JSA SONIC DRILL GROUP - E&I

JSA Hazard Codes

1-0000	General Sonic Drilling
1-0001	3.5" Rod Addition
1-0001-L	3.5" Rod Addition - Long Stroke
1-0002-H	Rod or casing Addition W/ Crane
1-0002	Rod or casing Addition
1-0002-L	5.5" Casing Addition - Long Stroke
1-0003	2' Deuce Addition
1-0004	3.5" Rod Removal - Short Stroke
1-0004-L	3.5" Rod Removal - Long Stroke
1-0005	5.5" Casing Removal
1-0005-H	Rod or Casing Removal W/Crane
1-0005-L	5.5" Casing Removal - Long Stroke
1-0006	5.5" Casing Deuce Removal
1-0007	Tower Up / Sonic
1-0008	Tower Down / Sonic

1-0009	Sonic Core Extraction
1-009R	Sonic Core Extraction - More difficult
1-009A	Sonic Core Extraction - Very Difficult
1-0010	Sonic Deck Lowering
1-0011	Sonic Deck raising
1-0012	Sonic wrench Operation
1-0013	Hydraulic Stabilizer Use
1-0014	Winch-Hoist Use
1-0015	Pit Pipe Installation / Sonic
1-0016	Pit Pipe Removal / Sonic
1-0017	Triplex Pump Operation / Sonic
1-0018	Mixer Tub Use / Sonic
1-0019	Sonic Split Barrel Use
1-0020	Sonic Split Barrel-Removal
1-0021	Sonic Water Sampling Equipment Installation
1-0022	Sonic Water Sampling Equipment Removal
1-0023	Sonic Wrench Carbide Changing
1-0024	Wrench Jaw Changing
1-0025	Sonic Wrench Removal / Installation

A-014	Moyno Pump Operation
A-015	Air Compressor Operation
D-031	Well Chemical Treatment
E-020	Generator Use
E-050	Pulling-Towing Disabled Equipment
E-055	Securing Job Sites-Equipment
E-065	Hot Pressure Washer Operation
E-075	Servicing Drill Rigs
E-080	Operating on Terrain
E-085R	Trailer Unloading-Semi/Lowboy
E-086	Trailer Loading -Semi/Lowboy
E-095	Underground Utility Line Dangers
E-095B	Overhead Utility Line Dangers
E-0129	Forklift Operation
E-130-1	Bobcat-Skidsteer - Trailer Unloading
E-130-2	Bobcat-Skidsteer - Trailer Loading
E-130-3	Bobcat-Skidsteer - Pre-Shift Inspection
E-130-4	Bobcat-Skidsteer - Startup / Shutdown

E-130-5 Bobcat-Skidsteer - Forklift Attachment Use

E-130-6 Bobcat-Skidsteer - Changing Attachments

E-135 ATV Support Equipment Operation

E-156 Spill Response

E-589 Video Log-Wells

E-707 Abandonment

R-001 Setting up on Drill Sites

R-0128 Water TruckSetup

R-0237 Cutting-Welding

AHA-1 Sonic drill & Allied Eq.

AHA-2 Crane Use

AHA-3 Power Tool-Eq. Operation

AHA-4 Heat - Cold Exposure

AHA-5 Vehicle - Truck operation

AHA-6 Material Handling - Movement

AHA-7 Refueling Equipment

000-0 JSA Risk Assessment Instructions

000-1 JSA Risk Table

000-2 JSA Hazard Codes

00-00 Blank JSA Forms

00-00 JSA Review Sign-Off Logs

Revised 1-2006

JSA HAZARD CODES

SB	Struck By
SA	Struck Against
CB	Contacted By
CW	Contact With
CO	Caught On
CI	Caught IN
CBT	Caught Between
E	Exposure
FS	Fall, Same Level
FB	Fall Below
OE	Over Exertion

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Drilling -General Date: April 1, 1997 New : X JSA#: 1-0000

Equipment Type: Sonic Drills Operator: Driller / Assistant Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM/KL Analysis: KL

Drilling and operation of allied equipment provides the crew to many exposures. All crew members must be alert at all times. They must have
Notes: proper training for each task and wear proper PPE at all times.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Job/Rig /Site Preshift	FS/FB/CW/SA: Falling hazard while climbing on rig or water truck deck. Contact with hazards while checking fluids and levels.	Wear proper PPE, use proper lifting techniques. Use caution when checking levels or condition of equipment with hands
Setup of Equipment	CBT/CB/FS/FB/SB: hazards include being caught between equipment, falling on the deck or ground, lifting hazards, pinning or pinching between tools or equipment.	Wear proper PPE. Be sure areas are clear before operating any of the rig equipment. Use caution when using hands for setup of equipment. The crew must use good verbal and eye contact during setup.
Operation of Sonic rig	SB/SA/CB/CW/CO/CI/CBT/FS/FB/OE/E: All exposures to injury are possible during drilling. Noise, mechanical failure, injury by pinning or pinching, working under hoisted loads and working with tools, equipment and fluids under pressure are some of the exposures. Contamination exposure is a hazard.	Crews must stay clear of operating equipment, be careful of hand and finger placements. Wear proper PPE at all times in the exclusion area and use good communication skills during work. Use safe lifting habits. Plan all tasks before doing. All personnel must have proper training. Noise over 85dB is a hazard.
Operation of allied equipment	SB/SA/CB/CW/CO/CI/CBT/FS/FB/OE/E: All exposures to injury are possible during drilling. Noise, mechanical failure, injury by pinning or pinching, working under hoisted loads and working with tools, equipment and fluids under pressure are some of the exposures.	Crews must stay clear of operating equipment, be careful of hand and finger placements. Wear proper PPE at all times in the exclusion area and use good communication skills during work. Use safe lifting habits. Plan all tasks before doing. All personnel must have proper task training.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Drilling -General

Date:

April 1, 1997

New :

X

JSA#:

1-0000

Boart Longyear Job Safety Analysis Form

Job or Operation: 3.5" Rod Addition Date: September 1, 2000 New : X JSA#: 1-0001
 Equipment Type: Sonic Rigs Operator: Driller/Assistant Revised: X BLA#
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Use proper PPE and good attention by all crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Move Sonic Head Up - No Rotation	CBT/SB Individuals can be caught between head and tower, chain and sprocket or struck by head movement	Stay in Safety Zones. Driller must be sure area is clear before moving head. Use NO rotation during movement
Tilt Head Out	SB/CW Workers can be struck by head, rod, spindle or subs when unit is swinging out	Stay out of yellow zone. Driller must watch that area is all clear.
Assistant Picks up rod and moves it to head spindle to install and shoulder up rod	OE/FS/SB Assitant must be careful of tripping, slipping, dropping rod and the weight of the rod as a lifting hazard	Use prper PPE including gloves. Keep deck clear, clean and with good traction. Use proper lifting techniques.
Driller Starts Rotation	CO/CW Rotation hazard. Burrs possible, Careful not to loose grip and drop rod	Driller stays at controls, uses slow rotation and rod loading mode. Assistant uses proper PPE including gloves. Keep hands out of inside of rod.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

3.5" Rod Addition

Date: September 1, 2000

New : X

JSA#: 1-0001

Rotation is stopped, Head Raised Up, Tilted In	CB/SB/CBT; Head or rod can strike assistant. Assistant can be caught between head, rod and tower.	Stay out of yellow zone. Driller must watch that area is all clear.
Head & Rod are lowered into wrenches for tightening and connection	CBT/SB Individuals can be caught between head and tower, chain and sproket or struck by head movement	Stay clear of travel. Keep hands away from chains and sprokets or cables

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Drill Rod Addition-Removal Date: January 1, 2006 New : X JSA#: 1-0001-4L

Equipment Type: Long Stroke Sonic Operator: Driller-Asst. Revised: _____ BLA# _____

Boart Longyear Division: E&I Reviewed By: LE Analysis: KL Risk # _____

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Connecting / Rigging and hoisting rod and sliding into or out of rod chute or stacked storage.	Hoisting Hazards, Finger / hand pin or pinch, struck by or against / dropping rod onto table, wrenches or platform	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure.
Connect or dis-connect of rod	Pin, pinch, Struck By, Struck Against, Loose rod dropping on to deck, table or wrenches.	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure and hands are clear before hoisting.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Drill Rod Addition-Removal

Date: January 1, 2006

New : X

JSA#: 1-0001-4L

Boart Longyear Job Safety Analysis Form

Job or Operation: 5.5" Casing Addition Date: September 1, 2000 New : X JSA#: 1-0002

Equipment Type: Sonic Rigs Operator: Driller/Assistant Revised: X BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Use proper PPE and good attention by all crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Move Sonic Head Up - No Rotation	CBT/SB Individuals can be caught between head and tower, chain and sprocket or struck by head movement	Stay in Safety Zones. Driller must be sure area is clear before moving head. Use NO rotation during movement
Tilt Head Out	SB/CW Workers can be struck by head, Casing, spindle or subs when unit is swinging out	Stay out of yellow zone. Driller must watch that area is all clear.
Assistant Picks up Casing and moves it to head spindle to install and shoulder up Casing	OE/FS/SB Assistant must be careful of tripping, slipping, dropping rod and the weight of the rod as a lifting hazard	Use proper PPE including gloves. Keep deck clear, clean and with good traction. Use proper lifting techniques.
Driller Starts rotation	CO/CW Rotation hazard. Burrs possible	Driller stays at controls, uses slow rotation and rod loading mode. Assistant uses proper PPE including gloves. Keep hands out of inside of Casing. Careful not to loose grip.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

5.5" Casing Addition

Date: September 1, 2000

New : X

JSA#: 1-0002

Rotation is stopped, Head Raised Up, Tilted In	CB/SB/CBT; Head or Casing can strike assistant. Assistant can be caught between head, rod and tower.	Stay out of yellow zone. Driller must watch that area is all clear.
Head & Casing are lowered into wrenches for tightening and connection	CBT/SB Individuals can be caught between head and tower, chain and sprocket or struck by head movement	Stay clear of travel. Keep hands away from chains and sprockets or cables

Boart Longyear Job Safety Analysis Form

Job or Operation: Rod or Casing Addition W/ Crane Date: January 1, 2001 New : X JSA#: 1-0002H
 Equipment Type: Sonic Rigs Operator: Driller/Assistant Revised: X BLA#
 Boart Longyear Division: EDD Reviewed By: SJ/MC Analysis: KL

Notes: Addition of heavier rod, casing or pie with the use of a crane . Use good verbal and hand signals and eye contact at all times.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Move Sonic Head Up - No Rotation	CBT/SB Individuals can be caught between head and tower, chain and sprocket or struck by head movement	Stay in Safety Zones. Driller must be sure area is clear before moving head. Use NO rotation during movement
Tilt Head Out	SB/CW Workers can be struck by head, Casing, spindle or subs when unit is swinging out	Stay out of yellow zone. Driller must watch that area is all clear.
Assistants balance and maneuver pipe or casing with crane and move it to head spindle to install and shoulder up rod or casing.	OE/FS/SB Assistants must be careful of finger or hand pinch or pin, tripping, slipping. Use eye contact between handler, driller and crane operator.	Use proper PPE including gloves. Use proper lifting appliances and guiding or tag lines to guide pipe while lifting. Keep deck clear, clean and with good traction.
Driller Starts rotation	CO/CW Rotation hazard. Burrs possible	Driller stays at controls, uses slow rotation and rod loading mode. Assistant uses proper PPE including gloves. Keep hands away from rod or casing.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Rod or Casing Addition W/ Crane

Date: January 1, 2001

New : X

JSA#: 1-0002H

Rotation is stopped, lifting line is slackened, hoisting appliances are removed.	CB/CBT hands or fingers can be caught between pipe and lifting appliances. Operation of the rotation, movement of the head or crane boom or lines could result in injury of the assistant removing the appliances.	Remove the lines and lifting appliances after the crane line or movement is stopped. Be sure to use good eye contact and communication to be sure all rotation and crane operation is stopped. Step back out of the yellow zone after the procedure is finished.
Head Raised Up, Tilted In	CB/SB/CBT; Head or Casing can strike assistant. Assistant can be caught between head, rod and tower.	Stay out of yellow zone. Driller must watch that area is all clear.
Head & Casing are lowered into wrenches for tightening and connection	CBT/SB Individuals can be caught between head and tower, chain and sprocket or struck by head movement	Stay clear of travel. Keep hands away from chains and sprockets or cables

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Drill Casing Addition-Removal Date: January 1, 2006 New : X JSA#: 1-0002-5L

Equipment Type: Long Stroke Sonic Operator: Driller-Asst. Revised: _____ BLA# _____

Boart Longyear Division: E&I Reviewed By: LE Analysis: KL Risk # _____

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Connecting / Rigging and hoisting casing onto stacked storage.	Hoisting Hazards, Finger / hand pin or pinch, struck by or against / dropping casing onto table, wrenches or platform	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure.
Connect or dis-connect of casing	Pin, pinch, Struck By, Struck Against, Loose casing dropping on to deck, table or wrenches.	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is secure and hands are clear before hoisting.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Drill Casing Addition-Removal

Date: January 1, 2006

New : X

JSA#: 1-0002-5L

Boart Longyear Job Safety Analysis Form

Job or Operation: 2' (deuce) Addition Date: September 1, 2000 New : X JSA#: 1-0003

Equipment Type: Sonic Rigs Operator: Driller/Assistant Revised: X BLA#

Boart Longyear Division: EDD Reviewed By: Analysis: KL

Notes: Use proper PPE and good attention by all crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Move Sonic Head Up - No Rotation	CBT/SB Individuals can be caught between head and tower, chain and sproket or struck by head movement	Stay in Safety Zones. Driller must be sure area is clear before moving head. Use NO rotation during movement
Tilt Head Out	SB/CW Workers can be struck by head, Casing, spindle, deuce or subs when unit is swinging out	Stay out of yellow zone. Driller must watch that area is all clear.
Assistant Picks up Casing and moves it to head spindle to install and shoulder up Casing	OE/FS/SB Assitant must be careful of tripping, slipping, dropping Deuce and the weight of the Deuce as a lifting hazard	Use prper PPE including gloves. Keep deck clear, clean and with good traction. Use proper lifting techniques.
Driller Starts rotation	CO/CW Rotation hazard. Burrs possible	Driller stays at controls, uses slow rotation and Rod/Casing loading mode. Assistant uses proper PPE including gloves. Keep hands out of inside of Casing.Careful not to loose grip.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

2' (deuce) Addition

Date: September 1, 2000

New :

X

JSA#:

1-0003

Rotation is stopped, Head Raised Up, Tilted In	CB/SB/CBT; Head or Deuce can strike assistant. Assistant can be caught between head, rod and tower.	Stay out of yellow zone. Driller must watch that area is all clear.
Head & Deuce are lowered into wrenches for tightening and connection	CBT/SB Individuals can be caught between head and tower, chain and sproket or struck by head movement	Stay clear of travel. Keep hands away from chains and sprokets or cables

Boart Longyear Job Safety Analysis Form

Job or Operation: 3.5" Rod Removal (Pulling Rods) Date: September 1, 2000 New : X JSA#: 1-0004

Equipment Type: Sonic Rig Operator: Driller / Assistant Revised: X BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Use proper PPE and good attention by crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break rod joint in wrenches	CW/CO/CB Rotation Hazard, wrench pinch or pin hazard	Stay clear of wrench, wear proper PPE, Stay clear of rotating rod
Raise Head And Rod (No Rotation)	CBT/SB; Pin or pinch between head and tower, sprocket and chains	Stay clear of travel and head. Stay clear of sprockets and chains
Tilt Head Out (No Rotation)	SB:Rod can strike people on deck	Stay clear of swing out travel. Stay out of yellow zone
Assistant grips rod to remove while driller starts low torque/speed rotation	CO/OE/FS: Rotation hazard, lifting hazard, slip-trip-fall hazard, burrs may be present	Use proper PPE, use correct lifting, keep deck clear, try and with good traction. Keep hands out of rod ends. Use good communication and eye contact during task.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: 3.5" Rod Removal (Pulling Rods)

Date: September 1, 2000

New : X

JSA#: 1-0004

Tilt Head In (no rotation)	SB/CBT Crew can be struck by head tilting in, or pinned between head and mast.	Stay clear of head movement path. Driller must be sure path of travel is clear before tilting head. Stay clear of sprockets and chains.
Lower Head and rod into wrenches	CBT/SB; Crew can be pinned or struck by head movement and sprocket chain movement	Stay clear of all movement areas. Driller should not lower until areas are all clear.
Close wrench jaws to grip rod for tightening	CBT; Pinch points	Driller must be sure area is clear before starting wrench operation.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Drill Rod Addition-Removal

Date: January 1, 2006

New : X

JSA#: 1-0001-4L

Equipment Type: Long Stroke Sonic

Operator: Driller-Asst.

Revised: _____

BLA# _____

Boat Longyear Division: E&I

Reviewed By: LE

Analysis: KL

Risk #

Notes:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Connecting / Rigging and hoisting rod and sliding into or out of rod chute or stacked storage.	Hoisting Hazards, Finger / hand pin or pinch, struck by or against / dropping rod onto table, wrenches or platform	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure.
Connect or dis-connect of rod	Pin, pinch, Struck By, Struck Against, Loose rod dropping on to deck, table or wrenches.	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure and hands are clear before hoisting.

Job or Operation: Sonic Drill Rod Addition-Removal

Date: January 1, 2006

New : X

JSA#: 1-0001-4L

Boart Longyear Job Safety Analysis Form

Job or Operation: 5.5" Casing Removal (Pulling Casing)

Date: September 1, 2000

New : X

JSA#: 1-0005

Equipment Type: Sonic Rig

Operator: Driller / Assistant

Revised: X

BLA#

Boart Longyear Division: EDD

Reviewed By: SP/ZM/DM

Analysis: KL

Notes: Use proper PPE and good attention by crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Casing joint in wrenches	CW/CO/CB Rotation Hazard, wrench pinch or pin hazard	Stay clear of wrench, wear proper PPE, Stay clear of rotating Casing
Raise Head And Casing (No Rotation)	CBT/SB; Pin or pinch between head and tower, sprocket and chains	Stay clear of travel and head. Stay clear of sprockets and chains
Tilt Head Out (No Rotation)	SB:Casing can strike people on deck	Stay clear of swing out travel. Stay out of yellow zone
Assistant grips Casing to remove while driller starts low torque/speed rotation	CO/OE/FS: Rotation hazard, lifting hazard, slip-trip-fall hazard, burrs may be present	Use proper PPE, use correct lifting, keep deck clear, try and with good traction. Keep hands out of Casing ends. Use good communication and eye contact during task.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: 5.5" Casing Removal (Pulling Casing)

Date: September 1, 2000

New : X

JSA#: 1-0005

Tilt Head In (no rotation)	SB/CBT Crew can be struck by head tilting in, or pinned between head and mast.	Stay clear of head movement path. Driller must be sure path of travel is clear before tilting head. Stay clear of sprockets and chains.
Lower Head and casing into wrenches	CBT/SB; Crew can be pinned or struck by head movement and sprocket chain movement	Stay clear of all movement areas. Driller should not lower until areas are all clear.
Close wrench jaws to grip rod for tightening	CBT; Pinch points	Driller must be sure area is clear before starting wrench operation.

Boart Longyear Job Safety Analysis Form

Job or Operation: Rod or Casing Deletion W/Crane Date: January 1, 2001 New : X JSA#: 1-0005H

Equipment Type: Sonic Rig Operator: Driller / Assistant Revised: X BLA#

Boart Longyear Division: EDD Reviewed By: SJ/MC Analysis: KL

Notes: Removal of heavier rod or casing w/crane. Use clear verbal and hand signals as well. Use with crane operations JSA.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Casing joint in wrenches	CW/CO/CB Rotation Hazard, wrench pinch or pin hazard	Stay clear of wrench, wear proper PPE, Stay clear of rotating Casing
Raise Head And Casing (No Rotation)	CBT/SB; Pin or pinch between head and tower, sprocket and chains	Stay clear of travel and head. Stay clear of sprockets and chains
Tilt Head Out (No Rotation)	SB: Casing can strike people on deck	Stay clear of swing out travel. Stay out of yellow zone
Asssistant moves crane and lifting appliances into place	CO/OE/FS: Rotation hazard, lifting hazard, slip-trip-fall hazard, burrs may be present. Hand and finger pinch is a hazard.	Use proper PPE, use correct crane rigging, keep deck clear, try and with good traction. Keep hands away from pipe and lifting appliances. Take slack out of lifting strap and appliance to take weight off of pipe. Use good communication and eye contact during task.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Rod or Casing Deletion W/Crane

Date: January 1, 2001

New : X

JSA#: 1-0005H

Slow rotation to disconnect the pipe rod or casing.	SB/CBT Crew can be struck by pipe coming off drill head. Rotation is a hazard.	Stay clear of rotation and lifting lines and appliances. When pipe is loose, balance and maneuver away from the spindle while crane operator moves crane back away from spindle.
Tilt head in	SB/CBT Crew can be struck head moving in	Do not tilt until crew, pipe and crane are clear of yellow area. Stay clear of head movement path. Driller must be sure path of travel is clear before tilting head. Do not rotate.
Lower Head and casing into wrenches	CBT/SB; Crew can be pinned or struck by head movement and sprocket chain movement	Stay clear of all movement areas. Driller should not lower until areas are all clear.
Close wrench jaws to grip rod for tightening	CBT; Pinch points	Driller must be sure area is clear before starting wrench operation.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Drill Casing Addition-Removal Date: January 1, 2006 New : X JSA#: 1-0002-5L

Equipment Type: Long Stroke Sonic Operator: Driller-Asst. Revised: _____ BLA# _____

Boart Longyear Division: E&I Reviewed By: LE Analysis: KL Risk # _____

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Connecting / Rigging and hoisting casing onto stacked storage.	Hoisting Hazards, Finger / hand pin or pinch, struck by or against / dropping casing onto table, wrenches or platform	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is fitted or plugs are secure.
Connect or dis-connect of casing	Pin, pinch, Struck By, Struck Against, Loose casing dropping on to deck, table or wrenches.	Alert everyone to operation. All eyes on operations and bystanders clear of area. Watch and communicate hoisting operation. Be sure rigging is secure and hands are clear before hoisting.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Drill Casing Addition-Removal

Date: January 1, 2006

New : X

JSA#: 1-0002-5L

Boart Longyear Job Safety Analysis Form

Job or Operation: 5.5" Casing Deuce Removal Date: September 1, 2000 New : X JSA#: 1-0006

Equipment Type: Sonic Rig Operator: Driller / Assistant Revised: X BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Use proper PPE and good attention by crew. Use verbal and hand signals as well as eye contact

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Casing joint in wrenches	CW/CO/CB Rotation Hazard, wrench pinch or pin hazard	Stay clear of wrench, wear proper PPE, Stay clear of rotating Deuce
Raise Head And Casing (No Rotation)	CBT/SB; Pin or pinch between head and tower, sprocket and chains	Stay clear of travel and head. Stay clear of sprockets and chains
Tilt Head Out (No Rotation)	SB:Casing can strike people on deck	Stay clear of swing out travel. Stay out of yellow zone
Assistant grips Deuce to remove while driller starts low torque/speed rotation	CO/OE/FS: Rotation hazard, lifting hazard, slip-trip-fall hazard, burrs may be present	Use proper PPE, use correct lifting, keep deck clear, try and with good traction. Keep hands out of Casing ends. Use good communication and eye contact during task.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: 5.5" Casing Deuce Removal

Date: September 1, 2000

New : X

JSA#: 1-0006

Tilt Head In (no rotation)	SB/CBT Crew can be struck by head tilting in, or pinned between head and mast.	Stay clear of head movement path. Driller must be sure path of travel is clear before tilting head. Stay clear of sprockets and chains.
Lower Head and casing into wrenches	CBT/SB; Crew can be pinned or struck by head movement and sprocket chain movement	Stay clear of all movement areas. Driller should not lower until areas are all clear.
Close wrench jaws to grip Deuce for tightening	CBT; Pinch points	Driller must be sure area is clear before starting wrench operation.

Boart Longyear Job Safety Analysis Form

Job or Operation: TOWER UP Date: September 1, 2000 New : X JSA#: 1-0007
 Equipment Type: Sonic Drill Operator: Driller Revised: X BLA#
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: All personnel within 35' of rig must be wearing proper all PPE. Everyone must be alert while raising or lowering tower or mast

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Clear Area	FS/FB; Slip, trip and fall	While checking area to be clear, be careful of traction and any items on deck. Be sure nothing loose is in tower. Be sure everyone knows tower will be raised or lowered. Eyes should be on tower.
Arrange all winch cables (if equipped)	CW, CBT: While handling cables and hooks, burrs may be present. Hand injury possible	Wear proper PPE including gloves.
Raise Tower	CB/CW/CBT/SB/CI; Falling objects, pin or stiking of body, arms, hands or fingers is possible between tower components and rig	Keep hands and fingers clear, everyone should have eyes on tower, and the area within 35' should be clear. Be sure stabilizers are down and stable.
Secure Tower-Install safety pins or bolts if applicable	CI/SA; Hand or finger injury, bump hazard	Use proper tools. Do not stick fingers in alignment holes. Be sure tower is stable, do not move while inserting pins or bolts
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

TOWER UP

Date: September 1, 2000

New : X

JSA#: 1-0007

Secure winch Cable	CB/CBT/CO; Cables have burrs, caught between cable and rig is possible	Use caution when operating a cable someone is holding on to. Wear proper PPE including gloves.

Boart Longyear Job Safety Analysis Form

Job or Operation: Tower/Mast Down Date: September 1, 1999 New : X JSA#: 1-0008
 Equipment Type: Sonic Operator: Driller Revised: Sep-00 BLA#
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: All personnel within 35' must have proper PPE and must be alert and watch as tower is lowered

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Unhook / free all winch cables and hooks/ extend	SA/CB/CI; Hand /Finger injuries possible	Wear proper PPE including gloves
Remove Safety Pins or Bolts	SA/CB/CI: Hand/finger injuries possible	Wear proper PPE including gloves. Use proper tools if needed.
Clear area, hoses and equipment clear	FS/SA; Slip / trip / fall while moving around deck	Proper PPE, use verbal and hand signals to clear area and be sure all hoses and cables are clear before lowering
Lower tower or mast	SB/CBT/CI/CB; Falling objects, snagged equipment or hoses, pinch or pin in moving parts between tower and rig	Guide cables, everyone must be alert and watch tower lowering, guide tower in equipment into parked position. BE SURE STABILIZERS ARE DOWN AND STABLE.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Tower/Mast Down

Date: September 1, 1999

New : X

JSA#: 1-0008

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Core Extraction Date: June 1, 1998 New : X JSA#: 1-0009

Equipment Type: Sonic Rigs Operator: Driller / Assistant Revised: Aug-99 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: We have had injuries during this operation. Mostly contact with fingers and hammers.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Bit / Core Barrel joint	CBT/CB: Pin or pinch in wrench area	Stay clear of wrench area. Driller be sure area is clear before using wrenches.
Move head and core barrel up from wrenches	CBT/SB/CB; Possible to pin or be hit by moving head or be caught in chain and sprockets(if equipped with) or cables.	Stay clear of head movement. Driller must be sure area is all clear and use verbal or hand signals before starting operation.
Tilt Head & Core Barrel back & lower to proper height for extraction	SB/CW/CB; Core barrel can strike anyone standing in yellow zone	Stay clear of swing out of barrel. Driller must be sure that area is clear. Stay out of yellow zone. Driller should use verbal or hand signals before swinging out barrel.
Remove core bit	CO/E/CW; Possible burrs on bit. Bit may be hot. Contamination may be present	Use proper PPE including gloves. Use tools if needed to remove bit. Do not put hands inside bit
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Core Extraction

Date: June 1, 1998

New : X

JSA#: 1-0009

Assistant slides plastic bag on to barrel for extraction of sample	CW/CO/E: Burrs on barrel possible, contact with barrel heat or contamination. Splash possible	Wear proper PPE. Use caution when contacting barrel with hands.
Driller engages vibration and may pound on barrel with hammer to loosen sample. Sample is retrieved in bag	E/CBT/OE/SB/CW; Assistant may be struck by driller pounding on barrel. Vibration is a hazard. Lifting and holding heavy sample bag in place. There is a splash and contamination hazard.	Use proper lifting stance and hand placement. Never be in contact with barrel during pounding or vibration. Use proper PPE.
Bag is removed and assistant gives bag to client or places it on deck.	OE/E/FS/FB: Lifting hazard, contamination exposure possible, trip, slip, fall possible	Use proper lifting, proper PPE, keep deck clear and dry or sand for traction. Be sure rails are in place.
Re-Attach Core Bit	CW/CO: Hand, finger injury, burrs on bit or barrel.	Use proper tools if needed. Use proper PPE including gloves, keep hands out of bit and barrel.
Move head up, in and down into wrenches for tightening of bit.	SB/CBT/CB: Can be struck by movement and swinging of the core barrel or head. Can be caught between the head, barrel and rig or chains and sprockets (if equipped)	Driller must be sure area is clear and use verbal or hand signals to warn crew of movement. No one in yellow area. Everyone should be clear of chains, cables and sprockets if rig is equipped.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Core Extraction Date: June 1, 2003 New : X JSA#: CTS1-009R
 Equipment Type: Mini & Standard Sonic Sonic Drill Operator: Driller / Assistant Revised: Feb-05 BLA# _____
 Boart Longyear Division: EDD Reviewed By: SJ Analysis: KL

Notes: Serious injuries including hammers striking hands or fingers have occurred during this operation. Use good communication.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Bit / Core Barrel joint	CBT/CB: Pin or pinch in wrench area	Stay clear of wrench area. Driller be sure area is clear before using wrenches.
Move head and core barrel up from wrenches	CBT/SB/CB; Possible to be pinned, pinched or hit by moving head or caught in chains, sprockets or cables.	Stay clear of head movement. Driller must be sure area is all clear and use verbal or hand signals before starting operation.
Tilt head & core barrel back and lower to waist height for sample extraction.	SB/CW/CB; Core barrel can strike anyone standing in caution zones	Stay clear of of barrel. Driller must be sure that area is clear. Stay out of yellow caution zone. Driller should use verbal or hand signals before moving head and barrel.
Remove core bit	CO/E/CW; Possible burrs on bit. The bit is sharp. Bit may be hot. Contamination may be present.	Use proper PPE including gloves. Use tools if needed to remove bit. Do not put hands inside bit. Do not use vibration during bit removal.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Core Extraction

Date: June 1, 2003

New : X

JSA#: CTS1-009R

Assistant slides correct length of plastic bag on to barrel for extraction of sample	CW/CO/E: Burrs on barrel possible, contact with barrel heat or contamination. Splash possible	Wear proper PPE including proper gloves such as heavy leather or Ansell Edmont 23-178 Monkey Grip Rubber gloves that protect you from contamination and burrs and also work well with slippery or wet conditions. Use caution when contacting barrel with hands.
Driller engages vibration and sample extrudes into plastic bag. If Sample Does Not Come Out Normally, STOP And Determine Steps For Safe Extraction...Refer to JSA CTS1-009A	E/CBT/OE/SB/CW; While driller is sounding the sample by use of a hammer, the assistant may be struck by driller pounding on barrel or hammer can slip or break and hit someone. Lifting and holding heavy sample bag in place can cause back strain. Bag can slip without proper grip. There is a splash and contamination hazard.	Use proper lifting stance(see lifting JSA) and grip for handling core samples. Wear proper gloves. Never be in contact with barrel during pounding. If the barrel needs to be sounded by pounding on it, use a one piece hammer such as an Estwing. Only the person doing the pounding can have a hand on the barrel. Everyone else needs to be out of the line of fire. Adjust level of barrel to proper height with the deck.
Bag is removed and assistant gives bag to client or places it on deck.	OE/E/FS/FB: Lifting hazard, contamination exposure possible, trip, slip, fall possible	Use proper lifting, do not twist while lifting, Use proper PPE, keep ground area clear and dry or sand for traction.
Re-Attach Core Bit	CW/CO: Hand, finger injury, burrs on bit or barrel. Bit may be warm or hot.	Use proper tools if needed. Use proper PPE including thick leather or rubber gloves, keep hands out of inside of the bit and barrel. Use alternate bit if bit is still hot.
Move head up, back to wrench center and down into wrenches for tightening of bit.	SB/CBT/CB: Can be struck by movement and swinging of the core barrel or head. Can be caught between the head, barrel and rig or wrenches.	Driller must be sure area is clear and use verbal or hand signals to warn crew of movement. No one in caution area. Everyone should be clear of head, barrel and wrenches.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Core Extraction of Difficult Sample Date: February 21, 2005 New : X JSA#: CTS1-009A

Equipment Type: Mini & Standard Sonic Drills Operator: Driller / Assistant Revised: BLA#

Boart Longyear Division: EDD Reviewed By: SJ Analysis: KL

Notes: Use this JSA when samples extrude with difficulty.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Sample does not extrude normally from the core barrel.	Back strain from lifting or improper body position. Body in the line of fire from improper extraction techniques. Cuts and lacerations from handling the core bit.	Stop operation analyze and determine optional methods of sample retrieval where extraction will be safer and/or easier.
Implement options that may be considered or used.	SB, SA, CB, CI, FB, FS: Lifting hazards, pin, pinch, strains and cuts, slips, trips, falls.	Be sure that optional methods are done safely and according to their particular JSA. Wear proper PPE. All workers stay out of the line of fire.
		Optional methods that may be considered include: Lowering barrel to the deck during vibration. Reposition of the barrel and / or the sample bag during this operation. Forcing a tool into the center of the sample to loosen it. (check with client to see if this portion of the sample is expendable). Use of a modified bit to allow for a slightly smaller or reamed core.
		Take shorter sample runs to help eliminate jamming of sample in the core barrel. Use of water pressure to force the sample out of the core barrel. Use of a split core barrel with plastic liners. Communicate with all employees and the client to determine what methods are acceptable and safe.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Core Extraction of Difficult Sample

Date: February 21, 2005

New : X

JSA#: CTS1-009A

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Deck Lowering Date: May 1, 1999 New : X JSA#: 1-0010

Equipment Type: Sonic Drills Operator: Driller Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Crew must wear proper PPE. Decks must be secured during travel of any kind. Always stay clear of deck drop zone.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Attach head or hoist to deck and take up slack and tension on safety chains or cables	FB/FS/CBT/CW: Climbing hazard, hand injury from contact with chains or cable.	Driller must be sure area is clear. Use caution when climbing on to deck. Be careful not to be pinned between deck and drill. Wear proper PPE and clear area around deck in case it falls.
Remove safety and travel chains, rods or cables	FS/FB/CBT/SB: Fall to deck or ground possible. Deck could drop without warning. Removing safety chains, hooks, pins or cables can cause hand injuries.	Wear proper PPE, keep everyone clear when detaching chains, rods, hooks or cables.
Lower deck by moving head or winch cables	SB/SA/CBT: Deck can fall on personnel on the ground	Driller must clear area and lower deck slowly to the ground. Give verbal or hand signal warnings to crew around deck.
Secure deck and install stairs and rails and other fall protection. Level deck with hydraulic stabilizers.	FB/FS/CB/OE: Lifting hazard, fall hazards	Wear proper PPE, Use caution when installing rails and fall protection. Use proper lifting techniques and use the stairs for entry to the deck.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Deck Lowering

Date:

May 1, 1999

New :

X

JSA#:

1-0010

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Deck Raising Date: July 6, 1999 New : X JSA#: 1-0011
 Equipment Type: Sonic Rig Operator: Driller Revised: Sep-00 BLA#
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Stay clear of deck drop zone during raising, lowering and travel.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Remove ladder, rails and other equipment from deck	OE/FS/FB/CB/CW: Lifting hazard, fall hazard, climbing hazard, lifting hazard, hand injury possible from handling chains, hooks or cables.	Wear proper PPE, use caution on deck with no rails or ladders. Use proper lifting techniques.
Hoist deck into travel position	CBT/FB/CB/SB; Hazards include being struck by deck, caught between deck and rig, falling off of deck.	Driller must clear area of deck and the deck drop zone. Use verbal and hand signals along with eye contact before raising deck. Be sure raising lines are of proper capacity. Watch during operation to be sure there is no interference of equipment or rig parts.
Secure deck with travel rods or chains	CW/FB/CBT: Hazards include hand injuries while handling chains, hooks and cables and falling while climbing off operator area or while securing travel rods or chains.	Wear proper PPE, use caution when climbing down from deck. Be sure deck is secure for travel and chains or rods are of proper capacity.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Deck Raising

Date:

July 6, 1999

New :

X

JSA#:

1-0011

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Wrench Operation Date: July 1, 1998 New : X JSA#: 1-0012
 Equipment Type: Sonic Rig Operator: Driller Revised: Sep-00 BLA#
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Never operate wrenches for any reason when hands or other body parts are in wrenches.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect wrenches for proper operation, condition and fit	CB/CW/CBT/CI: Hazards include sharp edges, the possibility of pinching or pinning in the jaws of the wrenches. Flying debris from pounding and prying on steel wrenches and parts. The head and other tools above wrenches are a hazard.	Wear proper PPE including glasses and gloves. Never operate wrenches when hands or other body parts are within wrenches. When running wrenches for inspection, be sure that the area is clear. Be sure head and other suspended tools are secure.
Operating or testing wrenches	CB/CW/CBT/CI: Hazards include sharp edges, the possibility of pinching or pinning in the jaws of the wrenches. Flying debris from pounding and prying on steel wrenches and parts.	Wear proper PPE including glasses and gloves. Never operate wrenches when hands or other body parts are within wrenches. When running wrenches for inspection, be sure that the area is clear. Be sure head and other suspended tools are secure. Operator must clear area before operating wrenches.
Repair of wrenches	CB/CW/CB/CI/E: Hazards include hand and finger injuries. Lifting injuries and pinching or pinning injuries. The wrenches contain many sharp edges and pinch points.	Never operate the hydraulics while hands are in the wrench area. Be sure to secure all tools or items suspended above the wrenches. Wear proper PPE. Rig must not be running.
Replacing Jaws or Carbide Teeth	CB/CW/CB/CI/E: Hazards include hand and finger injuries. Lifting injuries and pinching or pinning injuries. The wrenches contain many sharp edges and pinch points.	Never operate the hydraulics while hands are in the wrench area. Be sure to secure all tools or items suspended above the wrenches. Use proper tools for repair of wrenches and replacement of jaws or carbide teeth. Wear proper PPE. Rig must not be running.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Wrench Operation

Date:

July 1, 1998

New :

X

JSA#:

1-0012

Boart Longyear Job Safety Analysis Form

Job or Operation: Hydraulic Stabilizer Use Date: June 1, 1998 New : X JSA#: 1-0013

Equipment Type: Sonic / Auger/ Rotary Operator: Driller Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Use caution when using hydraulic stabilizers. Tipping of rig is possible.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Clear area of stabilizer travel & Inspect stabilizer components.	CW/CO: Parts of stabilizers contain pinch points and sharp edges.	Wear proper PPE. Be sure all pins and stabilizer parts are in good condition and secure. Check ground condition. Never work or be in the travel area of stabilizers when the rig is running.
Place blocking or cribbing on ground	OE/CBT/CB/CW: Lifting hazard, Bump hazard, hand or finger injuries possible by contact with the stabilizer or block or catching between.	Use caution when placing blocks and cribbing. Never let a person operate the stabilizers while someone has their hands or other body parts in the path of the stabilizer.
Lower Stabilizers	CBT/CB/CW: Pinning or pinching hazard. Possibility of rig being unstable and tipping if stabilizers do not contact solid ground.	Always clear stabilizer travel area. Use spotters to watch for proper landing of stabilizers. Lower stabilizers equally, a little at a time to test stability.
Raise stabilizers	CW/CO: Parts of stabilizers contain pinch points and sharp edges.	Always clear stabilizer travel area. Use spotters to watch for proper landing of stabilizers. Raise stabilizers equally, a little at a time to lower rig evenly and prevent tipping. Clean off any mud or dirt that would fall off during travel. Wear gloves.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Hydraulic Stabilizer Use

Date: June 1, 1998

New : X

JSA#: 1-0013

Remove and store blocking or cribbing	CBT/CW/OE: Lifting hazard, possible sharp edges or splinters	Always wear gloves. Use proper lifting. Use tools to dig out blocking if needed. Store and secure on deck.

Boart Longyear Job Safety Analysis Form

Job or Operation: Winch - Hoist Operation Date: June 1, 1997 New : X JSA#: 1-0014

Equipment Type: Sonic / Auger / Rotary / Cranes Operator: Driller / Assistant Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Winch and Hoist equipment requires daily inspections. It includes clamps, cables or hooks. Training is required.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect all winch equipment	CBT/CO/CI: Injury to hands or other body parts is possible. Broken or worn hoisting equipment can cause failures or serious injury. Cables contain frays and burrs that can injure hands.	Inspect all items including cable condition, hook and clamp condition. Verify proper capacities of all components. Be sure clamps are installed correctly. Be sure that safety hook catches work properly.
Clear area	CW/CBT/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools, breakage of cables or hooks.	Always clear area of hoisting. Keep verbal and eye contact with person running controls and all people in area of hoisting.
Hoist	CW/CBT/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools, breakage of cables or hooks can cause serious injury.	Always clear area of hoisting. Keep verbal and eye contact with person running control and all people in area of hoisting. Be sure hands or other body parts are not contacting cable or hooks while lifting. Wear proper PPE at all time. Never exceed capacity of components. All individuals must have proper training on hoisting. Never hoist a stationary object that is not loose.
Secure winch or hoisting tools after use	CBT/CO/CI: Injury to hands or other body parts is possible. Cables contain frays and burrs that can injure hands.	Wear proper PPE. Secure cables and hooks to solid mountings for travel. Do not put too much tension on equipment. Just enough to hold components in place. Inspect all components for wear, breakage or poor condition.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Winch - Hoist Operation

Date:

June 1, 1997

New :

X

JSA#:

1-0014

Boart Longyear Job Safety Analysis Form

Job or Operation: Pit Pipe Installation Date: November 1, 1999 New : X JSA#: 1-0015

Equipment Type: Sonic Drills Operator: Driller-Assistant Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Pit pipes are sometimes used in lieu of Cow Tanks. There is a JSA for each operation.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Unload Pit Pipe	SB/OE/CB/CBTFB/FB: The pipe is heavy and is a lifting hazard. It has sharp edges and injury to hands or the possibility of being caught between the pipe and rig or water truck is possible.	The pipe should be handled by two people. Use proper lifting techniques. Do not throw pipe off truck. Wear proper PPE including gloves.
Position Pit Pipe Under Rig	OE/CW/CBT: The task of positioning the pipe includes hazards such as lifting, bumping, being struck by the pipe and being caught between the pipe and other parts of the rig or ground.	Use caution when positioning the pipe. Be careful not to be caught between the pipe and other parts of the rig or ground. Crew should use good communication during this process. Wear proper PPE including gloves.
Pushing & Sealing Pipe	SB/CB/SA: The hazards include contact with the pipe and other parts of the rig or ground or injury by the tools used to push the pipe into the ground.	Wear proper PPE. When driller operates controls, no one should be touching or be near the pipe when the pipe is pushed into the ground. Bentonite may be used for a seal. Other hand tools may be used to install the pipe into the ground.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Pit Pipe Installation

Date: November 1, 1999

New : X

JSA#: 1-0015

Boart Longyear Job Safety Analysis Form

Job or Operation: Pit Pipe Removal Date: November 1, 1999 New : X JSA#: 1-0016

Equipment Type: Sonic Drills Operator: Driller - Assistant Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Used pit pipes may contain contamination

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Pull out pit pipe from boring	CBT/OE/SB/CB: Hazards include over exertion by pulling out pipe, lifting hazard, being caught between the pipe and other parts of the rig. If the pipe is pulled out mechanically by the drill rig feed or chain, this would also be a hazard. The pipe may contain soil or water contamination.	Wear proper PPE including gloves. Stay clear of pipe if it is being pulled out mechanically. Two people should move pipe out of area under rig. Be careful of being caught between pipe and rig or equipment. Rig may be moved rather than crawling under rig to remove the pipe. Use hand tools to dig out the pipe if necessary.
Storage of pipe	CBT/OE/SB/CB: Hazards include a lifting hazard, being caught between the pipe and other parts of the rig. Being struck by or contact with sharp areas of the pipe.	Remember to use caution with sharp edges, pinching fingers and getting caught between the pipe and the other areas of the storage area. Use caution in lifting and use a winch line (if available) or more then one person. Be sure to secure the pipe in the storage area.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Pit Pipe Removal

Date: November 1, 1999

New : X

JSA#: 1-0016

Boart Longyear Job Safety Analysis Form

Job or Operation: Triplex Pump Operation Date: August 1, 1997 New : X JSA#: 1-0017

Equipment Type: Sonic Drill Operator: Driller Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: Water under high pressure is a hazard. Be sure to control pressure and flow. Keep pump from freezing.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Attach inlet hose to water source & pump	CB/CW: Hazards include injury to hands while attaching the hoses by making connections to the valves and fittings. A trip hazard may be created by the use of hoses and a slip hazard may be present because of water. The hoses may contain wire burrs that can injure hands. The pump has moving parts that could be pinch points. A lifting hazard is also present.	Always wear proper PPE and run the hoses as not to create a trip hazard. Inspect all hoses, connections to be sure they are in good condition and are rated and can withstand the pressure that will be created by the pump. Guards must be in place to remove pinch points. Use caution when lifting large amounts of hose.
Pump Engagement	CB/CW/SB: High pressure water hazard. Water pressure may also cause movement and whipping of hoses. A plugged hose can burst causing high pressure water to escape.	Wear proper PPE. Always warn crew of pump engagement. Be sure lines are clear and not frozen or plugged. Whip checks must be installed on lines or hoses that may cause injury.
Pump shut down & water source disconnection	CB/SB: The hazards include hand injury from working valves and disconnection of fittings and hoses.	Wear proper PPE. Be sure to drain pump if used during cold temperatures. Use caution when lifting large amounts of hose. Store hose so a trip hazard is not created.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Triplex Pump Operation

Date: August 1, 1997

New : X

JSA#: 1-0017

Boart Longyear Job Safety Analysis Form

Job or Operation: Mixer Tub Use Date: June 1, 1998 New : X JSA#: 1-0018

Equipment Type: Sonic Rig Operator: Driller -Assistant Revised: Sep-00 BLA#

Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: KL

Notes: The use of Portland cement or bentonite also has hazards such as inhalation of these products.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Mixer set Up & Connections	SB/CW/CB/CI: Hazards include injury to hands, lifting hazards and trip hazards from hoses.	Be sure to wear proper PPE. Use two or more people to lift tub and put in place. Be sure to inspect all water & hydraulic connections.
Mixer Use	SB/CBT/CW/FB: Hazards include high pressure water, lifting bags of portland, trip hazards, the possibility of getting caught in mixer mechanism and the possibility of plugging of the outlet lines and moyno pump.	All operators must be trained in the use of the mixer. Operator must clear the area around mixer before engaging and give a verbal warning.
Cleaning Mixer	SB/CBT/CW/FB: Hazards include high pressure water, lifting bags of portland, trip hazards, the possibility of getting caught in mixer mechanism and the possibility of plugging of the outlet lines and moyno pump.	All operators must be trained in the use of the mixer. Operator must clear the area around mixer before engaging and give a verbal warning. Be sure to have proper PPE for handling Portland or bentonite hazards.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Mixer Tub Use

Date: June 1, 1998

New : X

JSA#: 1-0018

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Split Barrel Use Date: September 1, 2000 New : X JSA#: 1-0019
 Equipment Type: Sonic drill Rig Operator: Driller/Assistant(s) Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM/KL Analysis: SJ

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Assemble split barrel and install liner	CBT: Pinch or pin hazards	Wear proper PPE including gloves. Be sure of hand placement and wrenches used should be in good condition.
Move sonic head up (No Rotation)	CBT/SB: Individuals can be caught between head and tower, chain sprocket and cable or struck by head movement.	Stay in safety zones. Driller must be sure area is clear before moving head. Do not use rotation during movement
Tilt Head Out	SB/CW Workers can be struck by head or spindle when unit is swinging out.	Stay out of yellow zone. Driller must watch that area is all clear.
Assistant picks up split barrel and moves it to head spindle to install and shoulder up the barrel.	OE/FS/SB: Assistant must be careful of tripping, slipping or dropping barrel and the weight of the barrel as a lifting hazard.	Keep deck clear, clean and with good traction. Use proper lifting techniques.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Split Barrel Use

Date: September 1, 2000

New : X

JSA#: 1-0019

Tilt head in-No Rotation	SB/CBT: Crew can be struck by head tilting in or pinned between head and mast	Stay clear of head movement path. Driller must be sure path of travel is clear before tilting head. Stay clear of sprockets, chains and cables
Lower head into wrenches	CBT/SB: Crew can be pinned or struck by head movement and sprocket chain and cable movement	Stay clear of all movement areas. Driller should not lower head until all areas are clear.
Disassemble split barrel and remove liner	CBT: Pinch or pin hazards	Be sure to wear gloves. Be sure of hand placement and wrenches used must be in good condition.
Cap ends of liner and deliver liner to client	OE/E/FS/FB: Lifting hazard. Contamination exposure possible. Trip-Slip Fall possible.	Use proper lifting, proper PPE, keep deck and stairs clear and dry for traction. Be sure rails are in place.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Split Barrel-Removal

Date: September 1, 2000

New : X

JSA#: 1-0020

Equipment Type:	Sonic Drill Rig
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Operator: Driller/Assistant(s)

Revised: _____

BLA# _____

Boat Longyear Division: EDDReviewed By: SP/ZM/DM/KL

Analysis: SJ

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break all joints of split barrel	CW/CD/CB: Rotation hazard, wrench pin or pinch hazard.	Stay clear of wrench, wear proper PPE including gloves. Stay clear of rotating barrel.
Raise head and split barrel-No Rotation	CBT/SB: Pin or pinch between head and tower, sprocket, chains or cables.	Stay clear of travel and head. Stay clear of sprockets chains or cables.
Tilt head out-No Rotation	SB: Split barrel can strike people on deck.	Stay clear of swing out travel. Stay out of yellow zone.
Assistant grips split barrel to remove while the driller starts low torque/speed rotation	CO/OE/FS: Rotation hazard, lifting hazard, slip-trip-fall hazard, burrs may be present	Use correct lifting, keep deck clear, keep hands out of barrel end. Use good communication and eye contact during task.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Split Barrel-Removal

Date: September 1, 2000

New : X

JSA#: 1-0020

Driller starts rotation	CO/CW: Rotation hazard, burrs possible, careful not to loose grip and drop barrel.	driller stays at the controls. Uses slow rotation. Keep hands out of inside of barrel.
Rotation stopped. Head raised up, tilted in	CB/SB/CBT: Head or barrel can strike assistant. Assistant can be caught between head, barrel and tower.	Stay clear of yellow zone. Driller must watch that area is all clear.
Head and split barrel are lowered into wrenches for tightening and connection	CBT/SB: Individuals can be caught between head and tower, chain, sprocket,cables or struck by head movement.	Stay clear of travel. Keep hands away from chains, sprockets or cables.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Water Sampling Equipment Installation Date: September 1, 2000 New : X JSA#: 1-0021
 Equipment Type: Sonic Drill Rig-Sampling Equipment Operator: Driller/Assistant(s) Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM/KL Analysis: SJ
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Break Casing Joint	CW/CD/CB: Rotation hazard, wrench pinch or pin hazard	Stay clear of wrench, wear proper PPE, stay clear of rotating casing
Move sonic head up	CBT/SB: Individuals can be caught between head and tower, chain and sprocket or struck by head movement.	Stay clear of wrench, wear proper PPE, stay clear of rotating casing
Install screen assembly using wireline system	CW/CBT/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools. Breakage of cables or hooks can cause serious injury,	Always clear area of hoisting. Keep verbal and eye contact with person running controls and all people in area of hoisting. Be sure hands or other body parts are not contacting cable or hooks while lifting. Never exceed capacity of components. All individuals must use proper PPE.
Lower head into casing for tightening and connection	CBT/SB: Individuals can be caught between head and tower, chain and sprocket or struck by head movement.	Stay clear of all movement areas. Driller should not lower until areas are all clear.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Sonic Water Sampling Equipment

Job or Operation:

Installation

Date: September 1, 2000

New : X

JSA#: 1-0021

Vibrate and raise head and casing, exposing screen	CBT/SB: Individuals can be caught between head and tower, chain and sprocket or struck by head movement.	Stay clear of travel and head. Stay clear of sprockets, chains and cables.
Break Casing Joint	CW/CO/CB: Rotation hazard, wrench pin or pinch hazard	Stay clear of travel and head. Stay clear of sprockets, chains and cables.
Move sonic head up	CBT/SB: Individuals can be caught between head and tower, chain and sprocket or struck by head movement.	Stay clear of travel and head. Stay clear of sprockets, chains and cables.
Install pump and packer assembly using wire line	CW/CBT/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools. Breakage of cables or hooks can cause serious injury,	Always clear area of hoisting. Keep verbal and eye contact with person running controls and all people in area of hoisting. Be sure hands or other body parts are not contacting cable or hooks while lifting. Never exceed capacity of components. All individuals must use proper PPE.
Inflate packer	CB/CW/E: High pressure air or gas. Compressed air or nitrogen	Make sure fittings are secure and recommended PSIs are followed.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Water Sampling & Eq. Removal

Date: September 1, 2000

New : X

JSA#: 1-0022

Equipment Type: Sonic Drill Rig

Operator: Driller/Assistant(s)

Revised: _____

BLA# _____

Boart Longyear Division: EDD

Reviewed By: SP/ZM/DM/KL

Analysis: SJ

Notes: This JSA is used with JSA 1-0021

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Water Pump & Purge	CW/E: Electric hazard. Exposure to contaminated purge water,	Be sure all electric components are properly connected and all hoses are secure.
Deflate Packer	CB/CW/E: High pressure air or gas. (Compressed air or nitrogen hazards)	Be sure area is clear around release point of air or gas. Wear proper PPE.
Remove pump and packer assembly	CB/CW/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools, breakage of cables or hooks can cause serious injury.	Always clear area of hoisting. Keep verbal and eye contact with person running controls and all people in area of hoisting. Be sure hands or other body parts are not contacting hooks or cables while lifting. Never exceed capacity of components. All individuals must wear proper PPE.
Remove screen assembly	CB/CW/SB: Hoisting materials, tools or supplies can have hazards such as being pinned between rig and tools. Dropping equipment or tools, breakage of cables or hooks can cause serious injury.	Always clear area of hoisting. Keep verbal and eye contact with person running controls and all people in area of hoisting. Be sure hands or other body parts are not contacting hooks or cables while lifting. Never exceed capacity of components. All individuals must wear proper PPE.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Water Sampling & Eq. Removal

Date: September 1, 2000

New : X

JSA#: 1-0022

Lower head into casing for tightening and connection	CBT/SB: crew can pinned or struck by head movement and sprocket, chain or cables.	Stay clear of all movement areas. Driller should not lower until all areas are clear.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Wrench Carbide Changing Date: September 1, 2000 New : X JSA#: 1-0023
 Equipment Type: Sonic Drill Rig Operator: Driller/Assistant/Mechanic Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM/KL Analysis: SJ
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Remove bolts or pins that hold blocks in place that hold carbides. This may require use of a hammer and punch.	SB/SA: Hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face and eye would be common hazards.	This is best done with tower up and head in the raised and locked position. Proper PPE including gloves, eye or face, head and hearing protection are required. Be sure all tools and equipment being used are in good condition. A one piece hammer must be used. Some training is required.
Place block in vise and knock out carbide inserts using a hammer and punch	SB/SA: Hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face and eye would be common hazards.	This is best done with tower up and head in the raised and locked position. Proper PPE including gloves, eye or face, head and hearing protection are required. Be sure all tools and equipment being used are in good condition. A one piece hammer must be use
Using a hammer, tap new carbides into place.	SB/SA: Hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face and eye would be common hazards.	This is best done with tower up and head in the raised and locked position. Proper PPE including gloves, eye or face, head and hearing protection are required. Be sure all tools and equipment being used are in good condition. A one piece hammer must be use
Install block with new carbides back into wrenches. Reinstall bolts or pins to secure. Hammer may be needed.	SB/SA: Hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face and eye would be common hazards.	This is best done with tower up and head in the raised and locked position. Proper PPE including gloves, eye or face, head and hearing protection are required. Be sure all tools and equipment being used are in good condition. A one piece hammer must be use
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Wrench Carbide Changing

Date: September 1, 2000

New : X

JSA#: 1-0023

Boart Longyear Job Safety Analysis Form

Job or Operation: Wrench Jaw Changing Date: September 1, 2000 New : X JSA#: 1-0024
 Equipment Type: Sonic Drill Operator: Driller/Assistant/Mechani Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM/KL Analysis: SJ
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Remove bolts or pins that hold the wrench jaws in place. This may require the use of a hammer and punch.	SB/SA: hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face or eyes is common.	This is best done with the tower up and in the locked position. Use proper PPE including gloves and eye, head and hearing protection. Be sure all tools being used are in good condition, especially the hammer. A one piece hammer must be used. Some training is required.
Install new jaws and reinstall bolts or pins to secure. This may require the use of a hammer and punch.	SB/SA: hazards include injury to hands, face and eyes from using hand tools, hammer and punch. Smashed fingers and flying debris to face or eyes is common.	This is best done with the tower up and in the locked position. Use proper PPE including gloves and eye, head and hearing protection. Be sure all tools being used are in good condition, especially the hammer. A one piece hammer must be used. Some training is required.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Wrench Jaw Changing

Date: September 1, 2000

New : X

JSA#: 1-0024

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Wrench Removal/Installation Date: September 1, 2000 New : X JSA#: 1-0025
 Equipment Type: Sonic Drill Rig Operator: Mechanic-Driller-Asst Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: SP/ZM/DM Analysis: SJ
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Remove and install hydraulic hoses	E/SA: Pinched fingers, hydraulic fluid hazard, possible splash or spill	This is best done with the tower up and in the locked position. Wear proper PPE including eye, face, head and hearing protection. Hand tools must be in good condition. Hydraulic line caps and plugs along with absorbant materials must be used to stop oil flow or spill.
Remove and install fastening bolts	SA: pinched or smashed fingers and hands.	Be sure proper tools are available and use them.
Remove and reinstall wrench assembly using crane or forklift	CBT/CW/SB: Hoisting can have hand hazards such as being pinned between rig and object being hoisted. Dropping hoisted objects can assist serious injury.	Clear area of hoisting. Keep verbal and eye contact with person running control and people in the area. be sure hands or other body parts are not contacting lifting cables or chain. Never exceed capacity of components.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Sonic Wrench Removal/Installation

Date: September 1, 2000

New : X

JSA#: 1-0025

Boart Longyear Job Safety Analysis Form

Job or Operation: Moyno Pump Operation Date: July 1, 2001 New : x JSA#: A-014
 Equipment Type: Drill Rig Operator: Driller-Assistant Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: K.L. Analysis: K.L.

Notes: Pump is used for pumping water, grout or drilling mud and mixing grout.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect pump and related equipment before use.	CW, FS: Sharp areas may be present. Slip, trip or fall is possible	Wear proper PPE including gloves. Check all equipment over for proper type and capacity. Be sure whipp checks are installed on hoses and are set up to work properly. The hoses and fitting capacity must exceed the pump output capacity. Be sure guards are in place at rotation points.
Install suction and outlet hoses	CW, FS: Sharp areas may be present. Slip, trip or fall is possible	Wear proper PPE. Be sure hoses are not plugged or frozen.
Operate Pump	CW, E, SB: Hoses can plug off and blow out. Rotation areas are dangerous. High pressure fluids are a danger. Hoses can be a trip hazard. Fluids can be slippery.	Never use hands to move rotating parts. Be sure proper PPE is used including eye or face protection. Always operate pump from control panel. Never leave pump unattended. Keep hose from becoming a trip hazard. Keep surfaces clear and dry.
Disconnect pump and secure	SA, FS: Hoses and fittings can cause injury to hands and fingers. Slip, trip and fall is possible. Pressure may be present.	Always use proper PPE including gloves. Be sure pump is off and pressure is released prior to removal of hoses.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Moyno Pump Operation

Date: July 1, 2001

New : x

JSA#: A-014

Boart Longyear Job Safety Analysis Form

Job or Operation: Air Compressor Operation

Date: July 1, 2001

New : x

JSA#: A-015

Equipment Type: Sonic-Auger-Rotary-Smeal Rigs

Operator: Driller-Assistant

Revised: _____

BLA# _____

Boart Longyear Division: EDD

Reviewed By: K.L.

Analysis: K.L.

This JSA covers all engine driven Air Compressors: 85 CFM - 900 CFM @ 80 PSI-300 PSI Used for air drilling, hammers and development.

Notes: Inspect all hoses, valves and fittings before operation.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Pre-shift Inspection: Inspect All Components, hoses, clamps, fittings	FS, FB, SA, SB, E: Fall or slip from same level or from deck of units. Inspector may get caught on sharp edges, injure fingers or hands or be struck by oil or high pressure air that is stored in tanks or hoses that may be attached while inspecting unit.	Always use proper climbing techniques and safety or fall protection. Wear proper PPE while inspecting including safety glasses, gloves, safety toe shoes and hard hat and hearing protection. Be sure Whipp check cables or chains are in place and properly installed.
Start Up & Operation	E, SB, CW: During start up and air up, hoses can come loose or high pressure air or other fluids can be released at high velocity. Hoses can be a trip hazard. High pressure air and malfunction of safety and relief valves can cause explosion.	Wear proper PPE. Be aware of air outlets that may be open or equipment that may be loose. Keep clear of air outlets during startup. Be sure that valves are closed. Before startup, be sure all hoses and lines are properly connected. Give a verbal or hand signal before starting unit. Mark all hoses with cones.
Open air supply to drill	E, SB, CW: During operation, hoses can come loose or high pressure air or other fluids can be released at high velocity. Air is also harmful to hearing.	Alert all people in area that air valve will be opened. Wear proper PPE. Be sure everyone knows that hammer or other tools will be live.
Monitor Operation	SB, E, CB: Air, fluid, hoses, fittings can be released during operation, person operating valves or reading gauges can slip or fall or struck by defective equipment.	Use proper PPE. Be alert to changes or malfunctions of compressor the equipment it is supplying including air leaks, oil leaks, broken fittings, overheating or plugged lines. Be ready to shut down equipment or shut off air supply.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Air Compressor Operation

Date: July 1, 2001

New : x

JSA#: A-015

Shut down	FS, FB, E, SB: Slip and fall from deck or ground, struck by equipment, exposure to high pressure oil or air. Pressure may be present in lines or tanks or tools after shut down.	Wear proper PPE. Be alert, communicate intentions to all workers. Close valves, shut down unit. Pressure may be present in lines after shut down. Remove and store hoses and equipment properly.
Secure Unit & Equipment	FS, FB, E, SB, CBT: Slip and fall from deck or ground, struck by equipment, exposure to high pressure oil or air. Pressure may be present in lines or tanks or tools after shut down. Hands or fingers can be caught between equipment.	Secure all equipment in travel position. Be sure everything is clean and in its place and ready for next use. Inspect all equipment for condition. Write up any repairs needed.

Boart Longyear Job Safety Analysis Form

Job or Operation: Well Chemical Treatment Date: February 4, 2001 New : x JSA#: D-031
 Equipment Type: Well Development Operator: Pump Man-Operator Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: LE Analysis: KL

Notes: This JSA includes the use of Sufficants, Acids and Chlorine Treatments

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Transportation Of Well Chemicals	Spills, Releases, Damage from physical contact W/packaging container or contents	Secure all loads. Placard if required. Use manifest if required. Carry the MSDS for the product. Inspect containers for integrity. A spill kit must be on hand.
Handling Of Chemicals	Lifting hazard, injury to hands and feet by container from pinch, pin or dropping. Splashing of liquid, vapor or dust from chemical may cause burns, inhalation hazard or damage to skin or eyes. Spills or releases are possible.	Wear proper PPE including gloves and additional eye protection such as goggles and hand protection using chemical resistant or proof gloves. Dust mask or respirator if needed to control dust or vapors. If any chemical gets on you, follow directions for treatment such as washing with water. Refer to the MSDS or the label. Spill kit must be available.
Use of chemicals in well, pipes or system	Lifting hazard, injury to hands and feet by container from pinch, pin or dropping. Splashing of liquid, vapor or dust from chemical may cause burns, inhalation hazard or damage to skin or eyes. Spills or releases are possible.	Wear proper PPE including gloves and additional eye protection such as goggles and hand protection using chemical resistant or proof gloves. Dust mask or respirator if needed to control dust or vapors. If any chemical gets on you, follow directions for treatment. Refer to MSDS or Label. Be aware of air flow, breeze and wind. Stay upwind. Spill kit must be available.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Well Chemical Treatment

Date: February 4, 2001

New : x

JSA#: D-031

Boart Longyear Job Safety Analysis Form

Job or Operation: Generator Use Date: February 21, 2002 New : X JSA#: E-020
 Equipment Type: Gas or diesel Powered generator Operator: Old, Shop, Yard employee Revised: _____ BLA#: _____
 Boart Longyear Division: Environmental Drilling Division Reviewed By: KL Analysis: KL
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Setup Generator	E, CI, OE: Lifting hazard.	Use proper lifting techniques. Units must be handled by two people or mechanical means such as lift gate, crane or cart. Inspect the generator including oil & water levels before operation. Be sure to use grounding rod or cable before using unit. Unit may be set into leak proof tub in sensitive areas.
Start & Run Generator	SB, CB, SA: Electric shock hazard, exhaust and burn hazards. Noise hazard.	Wear proper PPE. Use GFI in line if the generator is not equipped with GFI outlets. Keep unit away from flammables and combustibles.
Store and secure unit	E, CI, OE: Lifting hazard.	Use proper lifting techniques. Units must be handled by two people or mechanical means such as lift gate, crane or cart. Inspect the generator including oil & water levels before operation. Be sure to use grounding rod or cable before using unit. Secure before moving truck or equipment.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Generator Use

Date: February 21, 2002

New : X

JSA#: E-020

Boart Longyear Job Safety Analysis Form

Job or Operation: Pulling / Towing Disabled Equipment

Date: January 5, 2002

New : X

JSA#: EDD-050

Equipment Type: Trucks & Equipment

Operator: Driller-Assistant

Revised: _____

BLA# _____

Boart Longyear Division: Environmental Drilling Division

Reviewed By: KL

Analysis: Field Staff

Notes: Refer to other JSA forms, like loading and unloading equipment

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Assess the situation: Determine the weight of equipment and extent that the equipment is stuck. Identify potential hazards and put together a plan of action.	FS; CW; E: There is a possibility of slip and fall or bumping into equipment while inspecting it. Equipment could shift and pin the inspector.	Wear proper PPE, use extreme caution when inspecting equipment. Be sure equipment is stable before crawling or moving around it. Determine the type of equipment to use- Tow truck Vs. Construction equipment.
Gather towing equipment together and inspect all equipment for condition and capacity.	CW; SB; CBT: Burrs and metal on equipment can cause injury to hands. Weight of equipment can cause back strains.	Wear proper PPE. Use proper lifting techniques. Use caution when handling chains, cables, hooks and slings. Be sure capacity of all equipment exceeds the requirements for the job. Be sure equipment is in good condition. Equipment must lift as it pulls.
Unload any unnecessary weight from stuck equipment or trucks.	E; OE; SB; FS; CB: Lifting, pin and pinching hazards. Slip, trip, twist and falls are additional hazards.	Use proper lifting techniques. Use caution moving equipment around in uneven terrain and soft ground conditions.
Hookup and Secure pulling equipment to stuck equipment and units used to pull out stuck equipment	CBT; FS; E: Slip, trip, fall, overexertion and getting caught between equipment and	Use proper lifting techniques. Use caution moving equipment around in uneven terrain and soft ground conditions. Use designated equipment for the pulling task. Hook pulling equipment to the proper areas on both the equipment being pulled and the equipment pulling. Pull equally. Never pull from or on one side of equipment.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Pulling / Towing Disabled Equipment

Date: January 5, 2002

New : X

JSA#: EDD-050

Pull equipment out	CB; CBT; SB: Cables or chains can break and fly striking people or equipment.	Keep people clear during pulling operation. Take slack out of pulling equipment before adding power. Blow horn to warn everyone in the area of operation. Use hand signals or two way radio if needed to communicate between puller and equipment being pulled out. Pull to safe stable level area.
Secure equipment	FS; FB; SB; CI: Can slip, trip or fall. Hands can be caught on burrs or pinched between equipment.	Set brakes, chock wheels. Remove pulling equipment, inspect and store away.

Boart Longyear Job Safety Analysis Form

Job or Operation: Securing Job Sites-Equipment Date: January 5, 2002 New : X JSA#: E-055

Equipment Type: Drilling Equipment Operator: Driller-Assistants Revised: BLA#

Boart Longyear Division: Environmental Drilling Division Reviewed By: KL Analysis: Field Staff

Notes: Use related JSA forms for related tasks while securing sites.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Hold a crew meeting to assess situation, procedure and assign designated tasks. Examine site	FS; SA: Slip, trip, fall.	Wear proper PPE. Use caution when examining site.
Secure boring, drill hole or well.	E; FB; OE; CBT; OE: Contact with contamination including chemicals and gas vapors. Tools, equipment and parts can cause injury to body parts including hands and feet. Use proper lifting techniques.	Wear proper PPE. Attach a cover to the well or casings top opening. Cover any open holes or excavations. Lower and attach the drill head if possible
Secure Rig deck, controls and operating equipment to prevent unauthorized use or vandalism.	FB; FS; OE; CBT: Injury, pinch or pin or contact with equipment and tools can occur.	Use proper lifting. Wear proper PPE. Disengage PTO, push in and activate kill buttons. Lower mast, raise lift gate and lower jacks. Remove ladder, chock wheels, lock tool boxes and lock cab doors.
Secure water truck and crane to prevent vandalism and unauthorized use.	FB; FS; OE; CBT: Injury, pinch or pin or contact with equipment and tools can occur.	Use proper lifting. Wear proper PPE. Secure crane, retract and lower. Disengage PTO. Chock wheels, lock tool boxes and lock cab doors. Secure and cover welder and pressure washer. Secure fuel cans. Remove ladder.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Securing Job Sites-Equipment

Date: January 5, 2002

New : X

JSA#: E-055

Secure job site area to prevent vandalism and unauthorized tampering and entry to site.	FB; FS; OE; CBT: Injury, pinch or pin or contact with equipment and tools can occur.	Use cones or caution tape to mark area. Remove trash and debris, secure lids on containers or drums, cover or remove soil cutting and drilling supplies. Lock up tools and equipment in tool boxes. Lock gates if present at site.

Boart Longyear Job Safety Analysis Form

Job or Operation: Hot Pressure Washer Operation

Date: February 20, 2002

New : JSA#: E-065

Equipment Type: Hot Pressure Washers

Operator: Shop, Field, Yard

Revised: X BLA#

Boart Longyear Division: Environmental Drilling Division

Reviewed By: KL

Analysis: KL

Notes:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect & Setup Pressure Washer For Use	CW,E, OE, FS: Pinch or cut fingers, Lifting, Slip, trip, fall.Electrical dangers and water pressure and hook ups.	Wear proper PPE including gloves, safety glasses and safety toe boots or shoes. Use proper lifting techniques if lifting or moving equipment. Be sure a GFI is used and all connections are dry and tight including electrical and water connections. Check hoses for cracks or breaks. Fuel bowl should be free of water. Check fuel level. Electrical cords must be in good repair. Be sure temperature is set at 160 F.
Fueling Unit	E, FB, OE, CW: Pinch or cut fingers, lifting, slip, trip, fall and exposure to fuel and fire-Explosion	Wear proper PPE including gloves, safety glasses and safety toe boots or shoes. Use proper lifting techniques if lifting or moving fuel containers. Be sure to use safety fuel cans. Eliminate all ignition sources. Don't spill fuel. Be prepared for fuel spills. Do not overfill and secure the fuel cap after filling.
Turn on water source, then burner while depressing trigger.	E, SB, CB: High pressure water and hot water. Fire or explosion, slippery surfaces. Water and debris from the high pressure water contact with equipment and soil debris.	Wear proper PPE including gloves, safety glasses, goggles or face shield, hearing protection, and safety toe shoes or boots. Wear water and/or chemical resistant coveralls. Check the hose and connections for leaks and proper operation. Never operate a pressure washer if the unit does not work at factory specs. Be sure safety trigger and relief valves work.
Pressure washer Use	E, SB, CB: High pressure water and hot water. Fire or explosion, slippery surfaces. Water and debris from the high pressure water contact with equipment and soil debris. Chemical contamination is possible. Burns from hot water are possible.	Wear Proper PPE. Guard against chemical contamination and exposure to very hot high pressure water and debris.Keep hose clear of tangling. Kepp unit from freezing.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Hot Pressure Washer Operation

Date: February 20, 2002

New :

JSA#: E-065

Secure unit for storage	E, FS, OE: Slip, trip, fall, exposure to electrical and water sources. Over exertion from moving or lifting.	Turn off power and water to unit. Drain water from unit and hoses to prevent freezing. Use air to blow out lines. Wear proper PPE at all times. Check hoses and equipment for any defects and write up repair form if needed. Always use proper lifting techniques. Use lift gates or cranes to hoist equipment onto truck platforms. Secure equipment to trucks before moving.

Boart Longyear Job Safety Analysis Form

Job or Operation: Servicing Drill Rigs Date: February 21, 2002 New : JSA#: E-075

Equipment Type: Environmental Drill Rigs Operator: Shop & Field Staff Revised: X BLA#

Boart Longyear Division: Environmental Drilling Division Reviewed By: KL Analysis: KL

Notes: Refer to specific JSA forms for tasks related to servicing drilling rigs

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Secure Equipment	SA, CW, E, OE, FS: Moving equipment, shafts and gears. Stored energy in cables and hooks or electrical systems. Contamination on or near equipment. Hot surfaces. Slippery surfaces.	Wear proper PPE, Use caution when climbing on equipment. Release air, water or oil pressure from equipment. Shut off equipment, set brakes and engage safety shut down switches. Chock wheels if applicable. Lower tower if applicable.
Determine extent of repair by examination and action to be taken	SA, CW, E, FS, OE: Slip, trip fall, exposure to contamination, pinch or catch body parts on or between equipment. Hot or slippery surfaces.	Wear proper PPE. Use caution when climbing on equipment during inspection. Use ladders and/or fall protection when doing inspections or working on equipment. Lockout or de-energize all power sources. Plan with other members of crew before continuing. Agree on a plan of action. Consult maintenance supervisors.
Service, Repair or Replace equipment	CB, CI, FS, FB, OE, SB: Slip, trip, fall, exposure to stored energy, high pressure water, oil, water or fluids. Pin or pinch hands in moving parts. Sharp or burred edges on equipment.	Wear proper PPE. Use proper tools and repair parts. Use fall protection for working above work decks or the ground. Be aware of weights of tools or equipment when lifting or exerting force. Never use drill heads, feeds, hoisting cables or equipment to access towers or equipment for repair.
Test all equipment before returning equipment to normal operation	SA, CW, E, OE, FS: Moving equipment, shafts and gears. Stored energy in cables and hooks or electrical systems. Contamination on or near equipment. Hot surfaces. Slippery surfaces.	Use caution when powering up equipment after repair. Disengage safety shut down switches and remove lock out-tag out equipment. Advise all individuals to pay attention during start up of equipment. Check for leaks and proper operation of repaired or replaced equipment. Use the same procedures as used with standard operation of equipment.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Servicing Drill Rigs

Date: February 21, 2002

New :

JSA#:

E-075

Boart Longyear Job Safety Analysis Form

Job or Operation: Operating On Terrain

Date: February 21, 2002

New : _____ X

JSA#: E-080

Equipment Type: Drilling & Allied Equipment

Operator: Driller & Assistants

Revised: _____

BLA# _____

Boart Longyear Division: Environmental Drilling Division

Reviewed By: _____ KL

Analysis: KL

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect & Examine terrain for drill equipment travel and operation	FS, OE, E: Slip, trip, fall. Possible exposure to contamination, poison oak and ivy. Possible ditches, soft ground ruts, rocks, stumps, debris and brush, stumps.Ice, snow, water, mud. Overhead or underground utilities, branches or tree limbs.	Use caution when examining terrain and site. Mark any hazards that may be in the way. Pick a stable and clear route to drill site.Levl off terrain or build roads to the drill location. Clear area or build pad at drill location if needed.
Transport equipment to drill location	CW, CB, SB: Obstructions, exposure to uneven ground, ditches, stumps, debris, ruts, rocks, ice, snow, trees and limbs. Tipping, rollover. Getting stuck or losing control while moving.	Use caution when moving on uneven or soft terrain. Use spotters while moving forward or back. Use mud or stabilization mats if needed.
Set Up Equipment	FS, FB, OE, E: Tipping or roll over of equipment, contact with existing branches or trees.	Wear proper PPE. Use pads under stabilizers. Level equipment. Stay clear of overhead and underground utilities or tree branches or limbs. Be alert when setting up equipment and raising towers. Mark worksite including the exclusion zone.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Operating On Terrain

Date: February 21, 2002

New : X

JSA#: E-080

Boart Longyear Job Safety Analysis Form

Job or Operation: Trailer Unloading Date: November 4, 2002 New : x JSA#: E-085 R
 Equipment Type: Interstate Low Boy Trailer Operator: Field, Shop, Yard Revised: Apr-03 BLA#
 Boart Longyear Division: EDD Reviewed By: LE - TM Analysis: KL

Notes: Trailer used for transport of ATV rigs, trucks and equipment pulled by a semi tractor.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect trailer, load and surroundings	Bumps, hand cuts, slip, trip and fall, local traffic hazard. You need sufficient room for the equipment to operate once it is off the trailer. If the trailer is not level, it may cause the load to shift while unloading. The tractor must be inline with the trailer to prevent tilting on the 5th wheel. The ground must be stable to keep the trailer from sinking and making the deck unlevel.	Inspect the parked trailer and tractor to be sure the unit wheels are chocked, brakes are set, the deck is level and the trailer is on level, stable ground, the trailer deck is clean and not slippery from rain, ice or snow. If it is, remove ice, use ice melt and sand deck as needed. Wear proper PPE such as gloves and hard hat. Mark the parked trailer with cones. Be sure there is proper space behind the trailer for unloading.
Lower Ramps and Remove Load Hold Downs	Lifting hazards when moving ramps down, stay clear of falling ramps. Hand and finger pinch by chains and ratchet binders. Rolling equipment if not secured by blocking or chocking. Falling equipment or tools if not stable on deck.	Be sure to secure load from rolling before hold downs are removed. Check to see that brakes are set and or load is chocked or blocked. Lower ramps to support rear of trailer. Be sure ramps are in proper position and width and free of mud, ice, snow or debris. Remove chain, binders and straps and remove from deck for storage later. Use blocks under the deck to keep it level.
Unload Equipment, tools	Contact by overhead branches, wire, obstructions. Sliding or slipping on deck. Rolling or sliding off deck if not level or stable on deck. Can slide off if turning the machine while backing, or making corrections when the machine is on the fulcrum point.	Use a spotter to back or drive off equipment. Use low power / speed when running or moving equipment on the deck. Do not turn on the deck, move equipment straight off the decks and ramps. Sit in seat and wear seat belt if machine is ROPS equipped. Wear proper PPE including gloves, safety toe boots or shoes, hard hat, hearing protection and safety glasses. Do not make corrections while moving machine.
Secure Trailer and equipment	Slip, trip, fall, hand or finger injuries from splinters, burrs. Traffic hazard. Lifting hazard from lifting chains, binders.	Clean off deck, fold up ramps, store chains, binders and straps. Mark trailer with cones when parked. Park it in a safe location. Chock tires.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Trailer Unloading

Date: November 4, 2002

New : x

JSA#: E-085 R

Post Trip Inspection	Slip, trip, fall, hand or finger injuries from splinters, burrs. Traffic hazard.	Complete a post trip inspection on the trailer at the end of the trip or day. Follow the DVIR inspection form and document the inspection after completion. Note any deficiencies for repair.

Boart Longyear Job Safety Analysis Form

Job or Operation: Trailer Loading Date: November 4, 2002 New : x JSA#: E-086
 Equipment Type: Interstate Low Boy Trailer Operator: Field, Shop, Yard Revised: BLA#
 Boart Longyear Division: EDD Reviewed By: LE - TM Analysis: KL

Notes: Trailer used for transport of ATV rigs, trucks and equipment pulled by a semi tractor.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect trailer and tractor (Pre-Trip) load and surroundings	Bumps, hand cuts, slip, trip and fall, local traffic hazard.	Inspect the parked trailer and tractor to be sure the unit wheels are chocked, brakes are set, the deck is level and the trailer is on level, stable ground, the trailer deck is clean and not slippery from rain, ice or snow. If it is, remove ice, use ice melt and sand deck as needed. Wear proper PPE such as gloves and hard hat. Mark the parked trailer with cones.
Lower Ramps and Get Out Load Hold Downs	Lifting hazards when moving ramps down, stay clear of falling ramps. Hand and finger pinch by chains and ratchet binders. Rolling equipment if not secured by blocking or chocking. Falling equipment or tools if not stable on deck.	Check to see that brakes are set on the trailer and tractor and they are chocked or blocked. Lower ramps to support rear of trailer. Be sure ramps are in proper position and width and free of mud, ice, snow or debris. Be sure the deck is clear and level.
Load Equipment, tools	Contact by overhead branches, wire, obstructions. Sliding or slipping on deck. Rolling or sliding off deck if not level or stable on deck.	Use a spotter to drive up or load equipment. Use low power / speed when running or moving equipment on the ramps or deck. Do not turn on the deck, move equipment straight up the decks and ramps. Sit in seat and wear seat belt if machine is ROPS equipped. Wear proper PPE including gloves, safety toe boots or shoes, hard hat, hearing protection and safety glasses
Secure equipment or tools	Slip, trip, fall, hand or finger injuries from splinters, burrs. Traffic hazard. Lifting hazard from lifting chains, binders.	Secure equipment by setting brakes or blocking. secure load with chains, binders and straps. Be sure chains, straps and binders are of proper capacity and all equipment is in good condition and exceeds the capacity of equipment secured. Fold up ramps. Clean off deck.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Trailer Loading

Date: November 4, 2002

New : x

JSA#: E-086

Do a walk around inspection of trailer, tractor and equipment.	Slip, trip, fall, hand or finger injuries from splinters, burrs. Traffic hazard.	Look for deficiencies, overhead and side clearances and that everything has been secured or stored before moving.

Boart Longyear Job Safety Analysis Form

Job or Operation: Underground Utility Line Dangers Date: June 1, 2001 New : X JSA#: E-095

Equipment Type: Drill Rigs-Excavating Eq. Operator: Driller-Assistants Revised: BLA#

Boart Longyear Division: EDD-CDD Reviewed By: Analysis: K.L.

Notes: This JSA refers to underground utility lines including electrical power, gas, fiber optic, water, sewer and product or chemical lines.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Identify Area Of Drilling, Digging or Excavation - Mark Area Boundaries. Mark each exact location of boring or excavation if possible.	FS; Slip, trip or fall possible. Traffic hazards. Contact with utility lines that may contain: electrical power (high and low voltage), gas (both liquid and gas), chemicals, fiber optic, water, sewer and storm sewer.	Wear proper PPE, use cones, flags, tape or other markers to identify boundaries of work including any extra underground disturbance.
Locate and inventory all possible utility conflicts with drilling or excavation.	FS; E; CW; Slip, trip or fall possible. Traffic hazards. Contact with utility lines.	Consult with property owner or maintenance supervisor responsible for property. Locate client or site maps that may show location of utilities. Call locator companies including one call or State or Province controlled organization. Use private locator if needed. Identify existing poles, meters, utility boxes. Inventory each utility.
Locate utility locator marking and compare with inventory of all possible utilities on site	FS, E, CW; Slip, trip, fall possible. Traffic hazards. Contact with utility lines.	Review the location of all utility marking and compare with the utility maps, inventory and location of meters, boxes and poles. In the case marks are unclear, can't be read or marks have been covered with snow or other material or have been washed away, call for a remark. Do not excavate or drill if marks or locations are not clear. Consult individual utility companies if needed.
Set up equipment at boring or excavation locations.	CW; E; FB; Slip, trip, fall, contact with equipment, exposure to utilities, traffic hazards.	Set up equipment a safe distance from utility marks using an extra margin for mis-marks. Use a safe distance depending on type of utilities. Use the utility suppliers safe distance. Take into account underground disturbance that can move earth or rock into a utility line causing a break. Stay a minimum of 10' from all electrical and gas lines. Stay a minimum of 20' from fiber optic lines.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Underground Utility Line Dangers

Date: June 1, 2001

New : X

JSA#: E-095

Observe as you drill or excavate	CW; SA; CBT; E: Contact with utilities, exposure to utility material or power, striking lines or pipes, traffic and equipment hazards.	Wear proper PPE. Be aware of changes in drilling sounds, contact with tape, marking material, wire, pipe or cable in boring, excavation or evidence of any material on drilling or sampling tools. Be aware of smells, sample changes in color or moisture. If in doubt, stop work immediately.
IN CASE OF CONTACT WITH UTILITIES	E: Exposure to fire, explosion, electrical shock, high pressure fluids including gas, water or other products including chemical contamination, toxic gas or waste.	Wear proper PPE. Stop work immediately. Evacuate to a safe area. Call utility companies, utilities. Call emergency workers including the fire department in the case of gas or chemical leaks. In the case of gas or chemical breaks, alert and evacuate any area people. Do not use any electrical equipment.
After control of any break situation	E: Exposure to fire, explosion, electrical shock, high pressure fluids including gas, water or other products including chemical contamination, toxic gas or waste.	Wear proper PPE. Document location of equipment Vs. location of utility marks and actual lines. Take pictures and complete a written report while on site.

Boart Longyear Job Safety Analysis Form

Job or Operation: Working Near Above Ground-Overhead Utilities Date: June 10, 2003 New : x JSA#: E-095B
 Equipment Type: All Drilling & Allied Equipment including Cranes Operator: Driller/Asst. Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: _____ Analysis: KL

Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Clear entire Area	Slip, Trip, Fall, Traffic hazards, Weather	Examine and clear the entire work area including the entire swing radius of equipment and the additional cable that will be used. Be sure all utilities are identified including voltage or capacity.
Setup the drill, crane or allied equipment.	Slip, Trip, Fall, Traffic hazards, Weather. Finger, hand pinch or pin	Stay 35'+ including any swing radius of cables or equipment from all electrical wires or product lines. Stay 10' from any cable TV or telephone lines. During wet weather, mist or rain, use greater distances. If you must be closer to electrical lines at any time, then they must be blanketed or power must be terminated.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Working Near Above Ground-Overhead

Job or Operation:

Utilities

Date: June 10, 2003

New : x

JSA#: E-095B

Boart Longyear Job Safety Analysis Form

Job or Operation: Forklift Operation

Date: May 16, 2001

New : x

JSA#: E-0129

Equipment Type: Rubber Tired and Constrction

Operator: Shop Personnel

Revised: _____

BLA# _____

Boat Longyear Division: EDD-E&I

Reviewed By: _____

Analysis: _____

Notes:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Operator must be trained for forklift safety	A forklift being operated by an inexperienced or poorly trained employee can lead to accidents, injury and even death.	Forklift safety training program.
Pre-operational inspection: mast, forks, air pressure in tires, use seat belt	Could drop load due to broken mast bolts. Could tip forklift over if you pick a load and tires are low on air.	Be familiar with machine you intend to operate. Know the control functions before you start.
Pick the load, move the load.	Spilling load, striking pedestrians or buildings or other vehicles.	Don't overload capacity of forklift. Watch for pedestrians or trucks that may come into your move area. Move load close to ground as possible, especially on rough, unlevel terrain because of center of gravity and blindspots caused by load. Always watch your steering corners at your back, the forklift steers from the back and swings out from the turn. Never allow a coworker to ride along on forklift. Never allow coworker to ride load up to truck bed.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Forklift Operation

Date: May 16, 2001

New : x

JSA#: E-0129

Boart Longyear Job Safety Analysis Form

Job or Operation: Trailer Unloading Date: October 31, 2005 New : X JSA#: E-130-1

Equipment Type: Bobcat or Skidsteer Operator: All Employees Revised: BLA#

Boart Longyear Division: EDD Reviewed By: LE Analysis: KL

Notes: The truck must be connected to the trailer. Read the operators manual located in the cab before operation of the unit.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Park the truck and Trailer	Traffic hazards, roll away, visibility issues; uneven surfaces.	Wear proper PPE including Hardhat, safety glasses, gloves, hearing protection, Safety toe boots or shoes and vest if in traffic areas or construction sites. Set brakes and chock the wheels of the trailer and the towing unit. Set out cones and use emergency flashers and strobe light if equipped. Park on level surfaces. Be sure you have good clearance for unloading including overhead, front and sides.
Prepare to unload unit	Traffic hazards, roll away, visibility issues; uneven surfaces, Pin/Pinch, strike against, cut, slip, trip and fall. Fall off trailer to ground. Be careful when lifting ramps.	Wear proper PPE as listed above. Read the operators manual if not totally familiar with the unit. Be sure the trailer is level, the machine brake is set and loader is in the down position. Remove chains and binders. Lower ramps and secure. Preshift and Check fluid levels. Be sure the path is clear below the trailer ramps and beyond. Keep the loader and bucket low, but high enough to clear the ground.
Unload unit from trailer.	Contact with, slip, trip, fall, fall to same level or off of trailer. Noise is also a hazard.	Wear proper PPE as listed above. Enter facing machine using three points of contact stepping on non slip surfaces. Sit in seat, fasten seat belt and lower safety bar. Be sure brake is set and controls are in neutral positions. Be sure area is clear and there are no bystanders along side or in the path of the unit. Open throttle about 25% and start unit. Check around unit visually and move unit down ramps forward at very slow speed.
Move unit to position on the ground and park.	Traffic hazards, roll away, visibility issues, unven ground surfaces, slip, trip, fall, strike against.	Wear proper PPE as listed. Park on level ground. Level bucket and lower loader. Set parking brake. Set throttle at idle for a few minutes. Shut off machine. Cycle hydraulic controls to release pressure. Shut off lights and accesories. Raise bar, remove seat belt. Remove key, lock covers and enclosures. Exit machine using three point contact and non slip surfaces. Never jump from the unit.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Trailer Unloading

Date: October 31, 2005

New : X

JSA#: E-130-1

Secure machine	Visibility of machine with local traffic. Damage to machine from vandals. Theft of unit. Roll away.	Be sure unit is in a safe area away from possible collision with traffic. Mark with reflective cones. Chock wheels. Position unit between other equipment or a structure and other trucks and equipment so that it can't be removed. Remove battery cable, battery or remote disconnect. Walk around unit and be sure everything is secure and there are no leaks.

Boart Longyear Job Safety Analysis Form

Job or Operation: Trailer Loading Date: October 31, 2005 New : X JSA#: E-130-2
 Equipment Type: Bobact or Skidsteer Operator: All Employees Revised: BLA#
 Boart Longyear Division: EDD Reviewed By: LE Analysis: KL

Notes: Read the operators manual located in the cab before operation of the unit. Complete a pre-shift before operating.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Park truck and trailer	Traffic hazards, roll away, visibility issues, uneven surfaces.	Park on a level clear area. Set brakes on the truck. Turn on the hazard flashers. Use reflective cones. Chock the wheels on the trailer and truck. Wear proper PPE including hardhat, safety glasses, gloves, hearing protection, safety toe boots or shoes and visibility vest.
Prepare to load the unit	Traffic hazards, roll away, visibility issues, uneven surfaces. Clearance issues. Slip, trip, fall, lifting hazards, pin, pinch, strike against, struck by.	Wear proper PPE. Be sure the trailer is clear, clean, dry and not slippery. Lower ramps. Be careful of lifting hazard. Adjust ramps for width as needed. Be sure they are dry and clean. Use sand for traction if they are wet or slippery. No ice or snow can be on the ramps.
Start Unit	Slip, trip, fall, pin and pinch, struck by, struck against. Slippery surfaces, noise.	If bucket and loader are in the down position, enter facing the loader using three points. Hold onto the handles on the cab, place feet in bucket, then on top of bucket, then top of loader cross arm and finally on floor of cab. Sit in seat, fasten seatbelt, lower bar, open throttle about 25%, clear area and start motor. Idle down, release brake, turn on strobe, raise loader slightly and move machine. Watch for traffic and obstructions..
Load unit on the trailer.	Slip off the ramps, backing hazard.	Back the unit up the to the trailer. Use a spotter. Use 25% throttle and back unit up the ramps using equal reverse force on the levers. Move slowly up the ramps and onto the trailer. Position on the trailer to distribute the weight.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Trailer Loading

Date: October 31, 2005

New : X

JSA#: E-130-2

Secure unit on the trailer	Slip, trip and fall. Noise hazard, bump hazard, pin and pinch hazards, lifting hazard.	Level bucket and lower loader. Set brake, reduce the throttle and idle a few minutes. Shut unit off. Neutralize the controls, shut electrical accessories off, raise bar, remove seat belt. Remove the key and secure. Exit the unit using three points of contact. Use chains and binders of adequate capacity to secure the unit. Raise and secure the trailer ramps.

Boart Longyear Job Safety Analysis Form

Job or Operation: Pre-Shift Inspection Date: November 1, 2005 New : X JSA#: E-130-3
 Equipment Type: Bobcat & Skidsteers Operator: All Employees Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: LE Analysis: KL

Notes: Refer to the operators manual before performing this task.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Walk Around Unit	Slip, trip, fall, uneven ground, debris or trip hazards, slippery surfaces.	Wear proper PPE including gloves, safety glasses, hard hat and safety toe boots or shoes. Have hearing protection available. Be sure the loader is in the down position unless the loader arms are braced, the brakes are set and wheels or tracks are chocked. Watch out for pin and pinch points. Look for any problems with the loader.
Inspect the unit	Slip, trip, fall, uneven ground, debris or trip hazards, slippery surfaces. Sharp edges, pin or pinch. Strike against.	Check the machine for broken, missing or damaged parts. Check the tires for cuts, bulges and correct air pressure. Check for leaks from the drive train or hydraulic system. Check fluid and fuel levels, belts and hoses. Never open a hot radiator. Top off fluids as needed. Use caution when fueling. Never overfill, never smoke or have open flames near the loader. Clean out tracks and check assemblies for adjustment.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Pre-Shift Inspection

Date: November 1, 2005

New : X

JSA#: E-130-3

Boart Longyear Job Safety Analysis Form

Job or Operation: Startup & Shutdown Date: November 1, 2005 New : X JSA#: E-130-4
 Equipment Type: Bobcat & Skidsteer Operator: All Employees Revised: BLA#
 Boart Longyear Division: EDD Reviewed By: LE Analysis: KL

Notes: Review the operators manual and information labels before operation of this machine. Training is required.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Enter machine cab and control area	Slip, trip, fall, strike against, caught between	Face the loader and use three points of contact. Use the handles on the front of the cab. Step into the bucket, onto the skid resistant area on the top of the bucket, then onto the loader arm and into the cab. Once seated, fasten the seatbelt and lower the safety bar. Turn on the lights and strobe.
Start unit	Pin, pinch, noise, unit can take off or hydraulic controls may be engaged.	Familiarize yourself with the controls. Consult the manual in the cab if not familiar and you have not been shown the proper operation of the unit. Refer to the quick reference or operators manual. Be sure the brake is set and the hydraulic and hydrostatic controls are neutralized. Open the throttle 25%. Be sure the area around the unit is clear. Start unit, idle down.
Operate unit	Noise, tip, roll over, striking people or obstructions. Uneven or rough ground conditions. Roll away, bump hazard.	Release the brake. Move the throttle to about 50%. Raise loader slightly. Smoothly engage controls. Watch area around the machine as you operate. Do not operate on steep inclines. Avoid sudden starts, stops, turns or direction changes. Control the speed. Keep loader low and the bucket level. Know the weight of items hauled and the capacity of the machine. Back up inclines..
Park the unit	Noise, tip, roll over, striking people or obstructions. Uneven or rough ground conditions. Roll away, bump hazard.	Stop travel of the machine. Pick a level parking spot away from traffic. Level the bucket, lower the loader to the ground. Reduce RPM to idle. Set the brake. Shut off the engine and all electrical equipment. Neutralize the hydraulic and hydrostatic controls. Lift the safety bar and remove the seat belt. Remove the key or secure the ignition system. Secure the covers and locks.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Startup & Shutdown

Date: November 1, 2005

New : X

JSA#: E-130-4

Exit the machine	Strike against, bump into, slip, trip, fall.	Exit machine by facing the cab, using three points of contact and holding onto the cab handles. Step onto the loader arm, then the top of the bucket and then into the bucket. Do not jump. Chock the wheels or tracks. Secure machine.

Boart Longyear Job Safety Analysis Form

Job or Operation: Fork Attachment Use Date: 11/1/05 New: X JSA#: E-130-5
 Equipment Type: Bobcat-Skidsteer Employee(s) Observed: All Employees Revised: Analysis BLA# Risk
 BLA Division: EDD Reviewed By: LE Made By: KL Level: Level:

Notes: Review operators manual before operation-Training is required to operate.

Review Due: _____

Required PPE: Hardhat, safety glasses, hearing protection, gloves, safety toe shoes or boots.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Approach pallet or material to pickup	Uneven or unstable ground conditions, hazards and debris in the path to load. Unstable machine with no weight on forks. Noise.	Wear proper PPE. Be sure the path is clear to the load and that the ground is stable. Approach with forks low to the ground. The machine will act differently with less weight on the front. Understand the load capacity of the forks and the machine. A tag listing that information is located on the forks. Use a spotter if needed. No one should be around the machine.
Insert forks and lift load	Uneven or unstable ground conditions, hazards and debris in the path to load. Unstable machine with no weight on forks. Tipping of load or machine is possible. Load can fall back onto the operator.	Be sure the forks are all the way under the load and that the forks are centered under load for good balance. Tilt back only slightly and be sure the load is balanced so that it will not fall back on the operator. Keep the load as low as possible while operating.
Operating with a load on the forks	Tipping, load falling off of the forks. Load falling into the operator. Damage to the machine or the load. Load hanging out and striking persons or property.	Be sure that the load is stable. Carry it low to the ground. No sudden stops or turns. Do not raise load until you come to the place you want to place the load. Stop completely before raising the load. Use low RPMs and low speed when transporting a load. Know what is around you. Only back up inclines with a load. Never traverse an slope.
Placing the load	Tipping, load falling off of the forks. Load falling into the operator. Damage to the machine or the load. Load tipping over. Damage to area where load will sit.	Be sure area where load will end up is stable. If putting load on a truck, be sure the brakes on the truck are set and the wheels are chocked. Lower the load slowly, leveling the load. Use low RPMs. Level the forks. Check the area and slowly back away being sure that the backup alarm is working.

Job or Operation:

Fork Attachment Use

Date:

11/1/05

New:

X

JSA#:

E-130-5

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

1. Struck By (SB)
 2. Struck Against (SA)
 3. Contacted By (CB)
 4. Contact With (CW)

5. Caught On (CO)
 6. Caught IN (CI)
 7. Caught Between (CBT)
 8. Fall - Same Level (FS)

9. Fall to Below (FB)
 10. Overexertion (OE)
 11. Exposure (E)

Boart Longyear Job Safety Analysis Form

Job or Operation: Changing Attachments Date: 11/1/05 New: x JSA#: E-130-6
 Equipment Type: Bobcat or skidsteer Employee(s) Observed: All Employees Revised: Analysis BLA# Risk
 BLA Division: EDD Reviewed By: LE Made By: KL Level:

Notes: Review the operators manual for this task

Review Due:

Required PPE: Hardhat, safety glasses, hearing protection, gloves, safety toe footwear.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Park and disconnect the existing attachment.	Pin, pinch, slip, trip, fall.	Review the operators manual for this task. Use low RPM. Level the attachment and lower to the ground. Set the parking brake. Put the existing attachment on stable level ground. Use the hydraulic Bob-Tach. If you don't have a Bobtach, then shut off machine and remove the attachment manually using all of the normal shutdown and dismount procedures.
Back away from the attachment	Tipping, striking people or property.	Release the brake, using low RPM back way from the attachment. Remember the machine is unstable with no attachments. Be sure area is clear. Use spotters if needed. Be sure backup alarm is working.
Approach new attachment	Pin, pinch, slip, trip, fall, caught between, caught in, strike against.	Review the operators manual for this task. Use low RPM. Approach the attachment. Use the hydraulic Bob-Tach. If you don't have a Bobtach, then line up the attachment, shut off machine and set the brake. Manually attach the attachment. Use the normal shutdown and dismount procedures. Never run the machine while manually attaching or removing attachments.

Job or Operation: Changing Attachments

Date: 11/1/05

New: ☒ x

JSA#: E-130-6

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

1. Struck By (SB)
2. Struck Against (SA)
3. Contacted By (CB)
4. Contact With (CW)

5. Caught On (CO)
6. Caught IN (CI)
7. Caught Between (CBT)
8. Fall - Same Level (FS)

9. Fall to Below (FB)
10. Overexertion (OE)
11. Exposure (E)

Boart Longyear Job Safety Analysis Form

Job or Operation: ATV Operation Date: March 5, 2005 New : X JSA#: E-135
 Equipment Type: Kubota RVT900-Polaris Ranger Operator: Drillers-Assistants Revised: May-05 BLA#
 Boart Longyear Division: EDD Reviewed By: Analysis: K.L.

Notes: Read the operators manual and review all of the labels and the load capacity before operation of these units.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Pre-operation inspection	Slip, Trip, Fall, Finger pin or pinch. Unit can roll, hood or panels can fall on individual inspecting unit. Lifting of hood or panels can cause a strain of back or arms.	Wear proper PPE including safety toe shoes or boots, gloves and safety glasses. Be sure unit is secure, wheels are chocked, brake set and unit can not roll. Use proper body position (no twisting) and proper lifting. Do not reach and lift access panels, the hood or box. Be sure they are unlatched before lifting or opening them. Completely inspect the unit including tire inflation and condition and fluid levels.
Starting unit	Fire, explosion, sudden movement. Finger pinch, Noise hazard. Overloading can cause lack of control or damage to machine componets	Be sure brake is set. Use proper PPE including hard hat and hearing protection in addition to safety toe shoes or boots, safety glasses and gloves. Sit in seat, place unit in neutral, foot on brake, open throttle 1/4, pre-heat if using diesel, operate starter. Never Use Ether or Starting Fluid at any time. After a safe startup, buckle seat belts.
Operation on normal terrain	Unsafe speed or maneuvers, Tipping, hitting stationary or moving equipment, property or individuals. Being hit by other equipment or automobiles.	Never travel faster then a fast walk. Units have the capabilty of speeds of 25 MPH. Never over load the units and be sure loads are balanced. Always wear the proper PPE and seat belts. Never operate on public streets or highways. Be sure to use a SMV sign for travel adjacent to pubic right of ways. Use extreme caution when turning with a loaded unit. Terrain must be smooth and free of holes, stumps and debris. Always clear the path of the unit
Operation on rough terrain	Tipping, roll over, damage to under side of unit including steering, transmission and axles. Personal injury.	Wear the proper PPE including a hard hat. Walk the route before driving on it . The route should be free of debris, hazards and holes. Operate no faster than a walking speed. Keep the load low.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

ATV Operation

Date: March 5, 2005

New : X

JSA#: E-135

Boart Longyear Job Safety Analysis Form

Job or Operation: Spill Response Date: April 23, 2002 New : x JSA#: E-156

Equipment Type: Shop, Yard, Field-All Equipment /Storage Operator: All Employees Revised: BLA#

Boart Longyear Division: Environmental Drilling Division Reviewed By: LE Analysis: KL

Notes: This JSA includes the use of posted emergency numbers and routes and the use of spill kits already available.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Respond To Spill	Fire, Explosion, toxic vapor, physical danger, slip, trip, fall, exposure or contamination.	Use extreme caution when approaching a spill. Analyze what happened and what the source is. Use proper PPE. Alert other people in the area of the spill. Your goal is to protect life, the environment and property. Refer to posted emergency numbers and evacuation route if needed. Follow any other procedure or plan listed for the site. Fire extinguisher must be on site and ready. Block off area.
Determine spilled substance - Determine threats	Fire, Explosion, toxic vapor, physical danger, slip, trip, fall, exposure or contamination.	Identify the spilled substance. Use extreme caution and use proper PPE. Determine if the substance is flammable, combustible, toxic or explosive by reading the label or using the label to ID the substance and then by using an MSDS. Pass this information along to everyone around the area once you get it. Evacuate the area if needed. Call for outside help if needed such as the fire department or spill response team.
Stop Flow Or Leak If Possible	Fire, Explosion, toxic vapor, physical danger, slip, trip, fall, exposure or contamination.	Use extreme caution when approaching a spill. Analyze what happened and what the source is. Use proper PPE. Alert other people in the area of the spill. Determine if the source of the spill can be controlled or eliminated. Shut down all equipment in the area. Use spill kit material to stop the flow. Block any drains in the area to avoid further spill travel.
Contain the Spill or substance	Fire, Explosion, toxic vapor, physical danger, slip, trip, fall, exposure or contamination.	Use proper PPE including gloves and goggles and respirator if needed. Use spill kit material to contain and absorb the spilled substance. Use an outside contractor if needed. Sand, soil or other material may be used to contain or absorb the spill. Transfer substances to safe containers if needed.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Spill Response

Date: April 23, 2002

New : x

JSA#: E-156

Clean Up	Fire, Explosion, toxic vapor, physical danger, slip, fall, exposure or contamination. Lifting hazard.	Use proper PPE including boots, goggles, gloves and respirator if needed. Use proper containers to dispose of spilled material. Contain the spill substance, spill media and other contaminated material in DOT approved 55 gallon open top drums, overpacks or other suitable approved containers. Decon all tools and equipment.
Report Incident	None noted	Report incident as soon as possible to your zone manager. The zone manager will determine who to contact and report the incident to. Document all actions and procedures used.
Disposal	Fire, Explosion, toxic vapor, physical danger, slip, fall, exposure or contamination. Lifting hazard.	Only dispose of materials as approved by Government regulations using approved methods. Be sure all paperwork and permits are in order.

Boart Longyear Job Safety Analysis Form

Job or Operation: Video Log Well Date: September 8, 2003 New : X JSA#: E-589

Equipment Type: Down The Hole Video Equipment Operator: Driller / Assts. Revised: BLA#

Boart Longyear Division: Environmental Reviewed By: L.E. Analysis: K.L.

Notes: Consult the Health & Safety Plan for contamination and other hazards.

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Traffic / Site Controls	Truck, Auto, Equipment Traffic. Unauthorized, untrained, improper PPE.	Wear proper PPE. Mark off area with orange cones, pylons or caution tape to form an exclusion zone. Wear Hi Visibility vests if zone is in a public or private traffic area. Use Health And Safety Plan to identify site hazards such as chemical, biological or physical. Be sure to use PPE required for the safety level.
Move Equipment into place	Slip, Trip, Fall, Uneven Ground. Lifting hazards, Heat stress. Chemical, metal or gas contamination hazards.	Identify slip / Trip / Fall hazards and remove or mark these hazards. Remove vegetation around well area. Review the contamination hazards and equipment all workers for any level of contamination. Use mechaical means to move or lift equipment weighing more than 50#. Drink plenty of fluids before entering the work zone. Follow the rules of the Health & Safety Plan.
Access the well	Finger or hand cuts or abrasions from sharp metal. Contamination. Electrical exposure.	Wear proper PPE for the contamination present. Wear gloves while working with well covers. Eliminate all electrical energy supplying the well. Use hoisting, lifting equipment or additional man power to remove heavy covers.
(If pump or other equiupment is present, refer to Removing Pump JSA) Install video equipment and lower into well.	Lifting. Finger cut or pinch. Chemical, Metal or Gas Contamination. Carbon Monoxide contamination if a generator is used. Noise from generator or hoist may exceed 85 dB.	Wear the proper PPE including Respiratory protection. Use a PID to determine contamination level before working near the well space. Use chemical and water proof Nitril gloves. Guard against cutting of camera wires while lowering camera. Be sure all shock hazards are eliminated. Use a GFI on any power source.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Video Log Well

Date: September 8, 2003

New : X

JSA#: E-589

Video Examination	Slippery conditions, contamination, noise, carbon monoxide, lifting hazard. Shock hazard.	Wear proper PPE, monitor contamination level, use GFI to limit shock hazards.
Remove video equipment from the well	Lifting hazard, contamination hazard, noise, carbon monoxide, shock hazard.	Use lifting help or mechanical hoisting. Wear proper PPE, monitor contamination level, use GFI to limit shock hazards.
Secure the well and work area	Lifting hazard, contamination hazard, noise, carbon monoxide, shock hazard. Finger or hand pinch or cut. Slippery surfaces.	Wear proper PPE including gloves. Use mechanical hoisting or help with lifting. Secure well cover to limit access to the well.
Decontamination	Contamination. Hot water exposure. Electrical exposure. Noise exposure. Slip, trip, fall. Lifting hazard. Drum or container handling.	Wear proper PPE for contamination and splash protection. Use a GFI on the electrical source. Use help with lifting, mechanical means or drum carts.

Boart Longyear Job Safety Analysis Form

Job or Operation: Abandonment-Protot/Bumper Removal Date: June 2, 2003 New : JSA#: E-707
 Equipment Type: Environmental Drill Rigs-Equipment Operator: Driller/Asst Revised: X BLA#
 Boart Longyear Division: EDD Reviewed By: KL-LE Analysis: EDD SCH-Crews

Notes: This is part of the well abandonment procedure

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Site Assessment	Utilities, Slip, Trip Fall, Insects, Poison Ivy, Heat, Weather, Brush, Trees, Ditches, Traffic	Wear proper PPE, Watch where your walking, Clear area. Determine best access. Pre-Shift & Safety meeting and analysis. Determine proper and safe way to do job.
Position Equipment	Utilities, Slip, Trip Fall, Insects, Poison Ivy, Heat, Weather, Brush, Trees, Ditches, Traffic. People traffic, Backin equipment, Overhead clearance. Uneven surface, soft ground, Unstable ground, restricted space,	Hazard Assessment, Backing spotter, Proper PPE, Clear vegetation, level the site. Chock blocks. Set up exclusion zone and cones. Reassessment of job if conditions change.
Equipment Setup	Utilities, Slip trip Fall, Insects etc.-- Pinch points, lifting hazards, Noise, Eye injury, Falling equipment, Tip over,	Proper PPE, proper blocking and stabilization, Use spotter, Assessment of situation. Reassessment of job if conditions change.
Do Task	Equipment failure, over loading, rotating equipment, hydraulic pressure, Breaking equipment failure of equipment, flying equipment or debris.	Proper Task Training, Proper PPE, The right equipment for the job, equipment and tools in good repair. Don't overload equipment, straight verticle pull, know how much your lifting or pulling, proper capacities of all equipment. Use mechanical jacks, hydraulic feed, winch straining verticle pull, proper capacity chains. Don't wrap cable around posts, Don't hook onto trucks or equipment and pull horizontally, don't run your equipment up against posts to
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation: Abandonment-Protop/Bumper Removal

Date: June 2, 2003

New :

JSA#: E-707

Boart Longyear Job Safety Analysis Form

Job or Operation: Setting Up On Drill Sites Date: October 6, 2004 New : X JSA#: R-001
 Equipment Type: Drill, Smeal, Probe Rigs-Water Trucks Operator: Driller/Assistant Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: KL Analysis: MB-RH
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Walk Around: Site, travel route and drilling location Inspection	Poor ground conditions including rough terrain, soft ground, obstructions, rocks, debris, trees, brush and branches, overhead or underground power or utility lines and water, swampy or poor ground conditions.	Note the site conditions, obstructions and terrain. Be sure the site travel and set up area is clear before bringing in equipment. Call the project manager if site preparation is needed or an alternate drilling location is required.
Inspect the overhead clearance of the site, travel route and setup area.	Overhead wire, supply pipes, trees or branches.	Be sure there is enough room for travel and maneuvering to the setup area. Stay safe distances from the utilities and obstructions. Mark the route if needed. Have the site leveled, prepared or pre-cut or trimmed by trained contractors if needed.
Move equipment to selected drill site.	Backing, blind spots, rocks, debris, soft ground.	Use at least one spotter with good communications between the driver and spotter while backing or driving forward. The spotter should watch all areas of travel including overhead. If the travel route becomes difficult, stop and assess the situation. Never move swiftly into a site to avoid getting stuck. Consult the project manager if alternative actions are needed.
Secure equipment at the drill site.	Trip, slip, fall	Wear proper PPE. Set brakes, put wheel chocks and cones into place. Use pads under stabilizers. Refer to other JSAs for stabilizer and tower up and down. There should be room around the work area and travel areas to safely walk. Remove any trip hazards such as rocks, roots and debris.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Setting Up On Drill Sites

Date: October 6, 2004

New : X

JSA#: R-001

Set up exclusion zone / work zone	Slip, trip, fall; danger of breaking air, water or hydraulic hoses; danger of mechanical hazards, hoisting hazards, chemical hazards and noise hazards	Use orange cones, pylons or yellow tape to mark exclusion zone. The exclusion zone/work zone radius must be at least the same measurement of the height of the tower. All people entering the exclusion zone/work zone must be PPE equipped with at least level "D" equipment. Level "C" or "B" if the safety plan calls for it.
Hold Safety Meeting	Work hazards	Identify and discuss all work hazards, both physical, biological and chemical. Review the JSA book for operations related to this job. Review the site health and safety plan or job plan.

Boart Longyear Job Safety Analysis Form

Job or Operation: Sonic Water Truck Setup Date: October 15, 2003 New : x JSA#: R-0128
 Equipment Type: Sonic Water Truck Or ATV Operator: Driller / Asst. Revised: BLA#
 Boart Longyear Division: Environmental Drilling Division Reviewed By: Analysis: KL
 Notes:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Inspect Setup Area	FS, SA, CB, CW, E; Slip, trip, fall; uneven, soft or unstable ground, sharp objects, rocks or debris on ground; overhead obstructions or utilities;	Inspect the entire area where equipment will travel and be setup. Clear area of obstructions
Move equipment	SB, SA, CBT: The truc or ATV can strike, be struck by or come into contact with obstructions or utilities	Always use a spotter(s) for forward and backing directions. Always have clear and constant contact between the driver and the spotter(s). Be sure the truck or ATV is level and secure and wheels or tracks are blocked and brakes are set.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Sonic Water Truck Setup

Date: October 15, 2003

New : x

JSA#: R-0128

Boart Longyear Job Safety Analysis Form

Job or Operation: Cutting - Welding Date: February 12, 2001 New : X JSA#: R-0237
 Equipment Type: Casing- 4"-12" Operator: Driller / Assistant Revised: _____ BLA# _____
 Boart Longyear Division: EDD Reviewed By: LE Analysis: KL
 Notes: _____

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure
Clear area for hot work.	Slip, trip, fall.	Wear proper PPE. Clear area of flammables. Combustibles including fuels, grass, debris. Wet ground and vegetation if needed. Cover items to protect from sparks or fire if needed. Be sure other individuals have the proper PPE. Obtain Hot Work Permit if required at the site..
Setup equipment-Torch, welder and tools	Slip, trip, fall. Pin, pinch, struck by or against	Wear proper PPE. Inspect all equipment during setup and before use. Include fire extinguisher and other fire fighting equipment if needed. Be sure welder is grounded properly and that anti back flow valves are installed. Brief and warn everyone in the area of the operation. Be sure casing is secure.
Cut or weld casing	Slip, trip, fall. Pin, pinch, struck by or against. Shock or burn from contact with flame , welding current or hot material. Fire, explosion or ignition of nearby material. Inhalation of fumes or smoke. Slag or flying sparks or debris from work area.	Wear proper PPE including special eye protection including smoked or tinted approved goggles or welding helmets with lenses to guard against flash or radiation burns, hard hat, flame resistant clothing and gloves. Use a person as a fire watch.
Secure casing-Secure site	Struck by, struck against, pin, pinch, hot surfaces. Flying material from hammering on steel surfaces	Be sure the casing is secure. Continue to use the proper PPE to guard against burns and flying debris. Check area for any hot areas, smoldering or evidence of heat damage. Check again after 30 minutes. Wet area down if there is any chance of ignition.
Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Cutting - Welding

Date: February 12, 2001

New : X

JSA#: R-0237

Secure equipment	Slip, trip, fall, pinch, pin, burn, electrical shock.	Wear proper PPE, turn off gas, O2 and electrical source. Be sure equipment is cool before putting it away. Remove regulators from gas cylinders and replace with the steel caps. Pickup all hose and cable and secure it.

Boart Longyear

Activity Hazard Analysis (AHA) Form

Equipment: Sonic Drill & Allied Equipment

Analyzed By: KL

Reviewed By: KL ①

Analyzed Date: June 1, 2000

Reviewed Date: June 10, 2000

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Inspection Of Equipment	Slip Trip Fall	Be careful. Keep areas clear. Use fall protection and proper stairs and ladders.
Inspection Of Equipment	Chemical Contamination	Wear proper PPE.
Inspection Of Equipment	Finger Pinch or Pin	Wear proper PPE. Be alert
Inspection Of Equipment	Improper Condition	Inspect all equipment per JSA.

Boart Longyear

Activity Hazard Analysis (AHA) Form

Equipment: Sonic Drill & Allied Equipment

Analyzed By: KL

Reviewed By: KL

②

Analyzed Date: June 1, 2000

Reviewed Date: June 10, 2000

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Crane Use - Hoisting	Improper Condition Of Equipment	Inspect all equipment prior to use. Be sure daily, monthly and annual inspections have been done and documented in inspection book.
Crane Use - Hoisting	Overhead Power, utility or transfer lines.	Stay the recommended safe distance from these hazards.
Crane Use - Hoisting	Failure of hooks, cables, slings or other hoisting equipment	Be sure equipment used is of the proper type, is setup correctly and is of the proper capacity
Crane Use - Hoisting	Spill	Be sure hydraulic hoses and fittings are in good condition. Inspect them before each use.

Activity Hazard Analysis (AHA) Form

Power Tool / Equipment Operation

Analyzed By: KL

Reviewed By: LE 3

Hard hat, safety glasses/goggles or face shield,
gloves, hearing protection, safety toe boots

Analyzed Date: December 6, 2006

Reviewed Date: December 8, 2006

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Check equipment for condition and correct fixtures, bits, discs etc.	Cut, pinch,	Check that cords are in good condition and guards are in place and the tool is clean and dry. Use the correct tool for the job.
Equipment operation	Electrical shock, flying debris, cuts, fire.	Be sure to use a GFCI. Pick the proper eyewear for the tool. Be in control of the equipment and be sure you have cleared the area of all combustibles and flammables.

Activity Hazard Analysis (AHA) Form

Severe Weather-Hot/Cold Exposure

Analyzed By: KL

Reviewed By: LE 4

PPE: Variable - continued

Analyzed Date: December 6, 2006

Reviewed Date: December 8, 2006

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Severe Weather	Slippery surfaces, lightning strikes, wind damage, flooding.	In addition to the proper PPE for the job, wear clothing suitable for the job. Use caution on slippery and wet surfaces to guard against slipping. In case of thunder or lightning, put tower down and saty away from equipment for 1/2 hour from last sign of thunder or lightning.
Severe Weather	Continued	Park equipment to guard against flooding. Know the forecast and the weather outlook. Remove equipment from possible flood areas when unattended.
Cold Weather	Cold Stress, Frost Bite	Wear clothing proper for the weather and the temperature. Have shelter and heat available. Block the wind. Take breaks as needed. Have food and liquids available.
Warm-Hot - Humid Weather	Heat stress/Heat stroke	Wear light clothing. Have and use shade when availble. Drink plenty of Gatorade before work and water during work. Have plenty of water available. Use cooling vests if needed. Don't drink caffeine. Don't drink alcohol for 12 hours before work.

Activity Hazard Analysis (AHA) Form

Vehicle-Truck Operation

Analyzed By: KL

Reviewed By: LE 5

PPE required: Gloves, Safety glasses, safety

Analyzed Date: December 6, 2006

Reviewed Date: December 8, 2006

toe boots

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Pre-trip Inspection	Slip, trip, fall, hand pin, pinch, cut	Complete a walk around and underhood inspection. Note and repair any deficiencies.
Operation	Bad weather, loss of control, crash, other vehicles and drivers, obstructions on site, soft ground or material.	Use defensive driver training. Use your seatbelt/harness. Use proper speed. Never overload a vehicle. Walk all off road areas you will drive on. Never drive on instable ground without a plan.
Parking	Roll away, unauthorized operation	Park in proper place, not in the way of traffic. Always set the brakes and chock the wheels,. Lock the doors and remove the keys. Use cones, flashers or strobe lights to mark the unit and give it visibility.

Activity Hazard Analysis (AHA) Form

Material Handling - Movement

Analyzed By: KL

Reviewed By: LE

6

Proper PPE: Hard hat, safety glasses, gloves

Analyzed Date: December 6, 2006

Reviewed Date: December 8, 2008

hearing protection, safety toe boots.

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Lifting	Back strain, back injury, cuts, scrapes, pin & pinch, slip, trip and fall.	Lift no more than 50#s individually, 100# with two people and over 100#s with mechanical means. Wear proper PPE. Use proper lifting including back straight and lifting with your legs. Bend your knees. Plan your path and be sure it is clear.
Crane use	Crane malfunction, contact with obstructions or overhead lines. Overload and tipping. Spills/leaks.	Complete the crane pre-shift inspection and document it. Clear area and be aware of employee positions. Use stabilizers and lift according to the capacity chart. Use hand signals and good communication. Wear the proper PPE. Have spill kit ready.
Forklift Use	Overload, tipping and overturn, leaks, spills	Do a pre-shift inspection. Observe the load capacity. Keep load low, use low speed. Wear seat belt and be sure the unit is ROPS equipped. Set the brakes, shutdown machine when not in use. Have spill kit and fire extinguisher.
Bobcat/Skid Steer	Overload, tipping and overturn, leaks, spills	Do a pre-shift inspection. Observe the load capacity. Keep load low, use low speed. Wear seat belt and be sure the unit is ROPS equipped. Set the brakes, shutdown machine when not in use. Have spill kit and fire extinguisher.

Activity Hazard Analysis (AHA) Form

Refueling Equipment

Analyzed By: KL

Reviewed By: LE ⑦

Safety Glasses, gloves, safety toe boots

Analyzed Date: December 6, 2006

Reviewed Date: December 8, 2006

Activity-Procedure	Potential Hazards	Recommended Controls
<i>Identify the principal steps involved, including the equipment and machinery to be used, and the sequence of work activities</i>	<i>Analyze each principal step and list its potential hazards</i>	<i>Develop specific controls for each potential hazard, also: * List inspection requirements for the equipment/machinery * Specify worker training requirements</i>
Secure vehicle	Roll away	Be sure to set the brakes and put wheel chocks under wheels. Be sure to be in a safe place for fueling and be aware of traffic.
Fuel vehicle / Equipment	Fire, explosion, leak, spill	Be sure there are no spark sources or flames around fueling area. Be sure equipment is cooled down. Have a fire extinguisher and spill kit available. Use a safety can or approved knozzel to dispense fuel. Guard against spills/overflows - stay with equipment.

If you are assessing risk on an existing JSA skip to step 6

- 1 Evaluate the process or task and determine specific steps in the process. Place these steps in proper sequence
- 2 Determine and list "potential hazards" (accidental injury, damage, or exposure) for each step
- 3 List the recommended safe job procedure, PPE or other safety measure to be taken to eliminate the potential accident or injury
- 4 Review with operators and amend as necessary
- 5 Approval by an appropriate person (a person with operational experience in that area)
- 6 Rate the risk for each job step
- 7 The highest rated job step becomes the overall rating for the JSA
- 8 Take appropriate action based on resulting score (seek assistance as necessary)
- 9 Add risk level score to space provided on JSA

Risk Assessment Table

Severity of Injury	How Likely?					
		No Likelihood	Unlikely	Reasonably Likely	Highly Likely	Occurred
	First Aid	1	2	4	7	11
	Medical Treatment	3	5	8	12	16
	Lost time	6	9	13	17	20
	Permanent Disability	10	14	18	21	23
Fatality	15	19	22	24	25	

Score	Risk	Action
1 - 5	Low Risk	Warn. Continue to monitor and control, if necessary, within 30-60 days.
6 - 10	Moderate	Interim controls to be used. Plan to control within 30 days.
11 - 17	Significant	Stop work as needed. Interim controls can be used. Control within 1-2 weeks
18 - 25	Extreme	Stop work and control hazard before use.
Note: Risk score between 11-25 requires a JSA or work instruction prior to commencement of job		

Note: Enter score on front page of JSA

Risk Assessment done By:

JSA HAZARD CODES

SB	Struck By
SA	Struck Against
CB	Contacted By
CW	Contact With
CO	Caught On
CI	Caught IN
CBT	Caught Between
E	Exposure
FS	Fall, Same Level
FB	Fall Below
OE	Over Exertion

Boart Longyear Job Safety Analysis Form

Job or Operation: _____ Date: _____ New: _____ JSA#: _____
 Equipment Type: _____ Employee(s) Observed: _____ Revised: _____ BLA# _____
 BLA Division: _____ Reviewed By: _____ Analysis Made By: _____ Risk Level: _____
 Notes: _____ Review Due: _____

Required PPE:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

Job or Operation:

Date:

New:

JSA#:

Sequence of Basic Job Steps	Potential Hazards Unsafe Acts or Conditions	Recommended Safe Job Procedure

- 1. Struck By (SB)
- 2. Struck Against (SA)
- 3. Contacted By (CB)
- 4. Contact With (CW)

- 5. Caught On (CO)
- 6. Caught IN (CI)
- 7. Caught Between (CBT)
- 8. Fall - Same Level (FS)

- 9. Fall to Below (FB)
- 10. Overexertion (OE)
- 11. Exposure (E)

Boart Longyear Job Safety Analysis Form

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SONIC DRILL

JSA SIGN-OFF

All operators and assistants of the Sonic Drill Rig and allied equipment must read and review all related JSA sheets and sign off on this sheet before operating or assisting on the rig or allied equipment.

If changes to existing JSA sheets are needed or if additional JSA sheets are needed for the safe operation of this equipment, blank JSA sheets are included in this book.

After changing, modifying or creating new JSA sheets for operations related to this rig or allied equipment, forward a copy to your branch manager or Keith Laszewski at Schofield so that they may be included in future revisions.

Declaration:

I have reviewed and understand all of the JSA sheets related to the operation of the Sonic Drill Rig and allied equipment. I will be sure to have any new operators or assistants review the JSA sheets before they are involved in the operation of this equipment.

I will modify or create new JSA sheets as needed for additional operations and forward a copy for inclusion in revisions of this book.

RIG # _____

X	_____	_____	_____
	Signature	Print Name	Date
X	_____	_____	_____
	Signature	Print Name	Date
X	_____	_____	_____
	Signature	Print Name	Date
X	_____	_____	_____
	Signature	Print Name	Date

Subcontractor JSAs

US Environmental

CHEMICAL HAZARDS:

List all Known or suspected chemicals on the site

1. Dinoseb
2. Acifluorfen Sodium Salt
3. Crop Oils
4. Crop Surfactants
5. Crop Adjuvants
6. Nitrogen

HEALTH HAZARD DATA

SUBSTANCE	EXPOSURE LIMIT	IDLH LEVEL	PHYSICAL DESCRIPTION	HEALTH EFFECTS	ROUTE OF ENTRY	FIRST AID
Dinoseb CAS # 88-85-7	Probable oral lethal dose 5-50 mg/kg	N/A	Orange-brown solids	Extremely Toxic	Ingestion, skin contact, inhalation	Remove contaminated clothing and wash with soap and water followed by a fresh water rinse.
Acifluorfen Sodium Salt CAS # 62476-59-9	N/A	N/A	White Powder.	Irritating to skin and eyes	Skin contact	Remove contaminated clothing and wash with soap and water followed by a fresh water rinse.
Oil, Spray	N/A	N/A	Oily light brown liquid with the odor of kerosene.	Slightly irritating to eyes and nose.	Skin contact, ingestion, inhalation.	Remove contaminated clothing and wash with soap and water followed by a fresh water rinse.

SUBSTANCE	EXPOSURE LIMIT	IDLH LEVEL	PHYSICAL DESCRIPTION	HEALTH EFFECTS	ROUTE OF ENTRY	<i>FIRST AID</i>
Nitrogen CAS 7727-37-9	OSHA lists as Simple Asphyxiant	N.D.	A colorless odorless gas. Noncombustible and nontoxic.	Vapors may cause dizziness or asphyxiation without warning.	Inhalation	Move victim to fresh air. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult.

HEALTH HAZARDS:

ACUTE (Short-Term) Hazards:

- Inhalation – Some of the products may be irritating to respiratory tract; may cause pulmonary edema; may also cause a headache, nausea, weakness, dizziness, and loss of coordination or judgment.
- Eye/Skin Contact - Expected to be irritating to eyes and skin.

CHRONIC (Long-Term) Hazards:

- None known

PHYSICAL HAZARDS

Task Specific Hazard Analysis

Task	Potential Hazard	Precautions
Mobilization	<ul style="list-style-type: none"> Heavy manual lifting/moving Slip/trip/hit/fall Heavy Equipment Falling loads 	<ul style="list-style-type: none"> instruct personnel in proper lifting technique, get help mechanize repetitious lifts and lifts > 50 lbs when possible use hand protection such as leather gloves maintain walkways clear of obstructions, maintain 3 points of contact maintain safe distances maintain eye contact between ground crew and operator Stand clear of lifted loads
Site Preparation	<ul style="list-style-type: none"> Heavy Equipment Contact with contaminated liquids and/ or solids Exposure to hazardous atmospheres Slip and Fall Heavy manual lifting/moving Puncture and laceration wounds 	<ul style="list-style-type: none"> maintain safe distances ground traffic maintain eye contact with operator avoid contact with visible contamination implement site controls (e.g. work zones and decontamination plan) implement air monitoring plan and ensure PPE usage matches the HASP maintain walking surfaces in an even, unbroken, obstacle free condition instruct personnel in proper lifting technique mechanize repetitious lifts and lifts > 50 lbs when possible use hand protection such as leather gloves survey for and remove wreckage and debris from work areas which pose puncture and laceration hazards
General Operations	<ul style="list-style-type: none"> Vehicle Traffic 	<ul style="list-style-type: none"> maintain safe distances from ground traffic, maintain eye contact with the driver, wear traffic safety vest

Task	Potential Hazard	Precautions
Establish fire protection for prevention, control, and suppression	<ul style="list-style-type: none"> • Contact with hazardous materials • Flammable or explosive atmospheres • Exposure to extremely high levels of heat • Slip/trip/hit/fall • Heavy manual lifting/moving • Puncture and laceration wounds • Insufficient fire flow to protect personnel, loss of fire system during fire fighting ops 	<ul style="list-style-type: none"> • avoid contact with visible contamination • implement air monitoring plan and ensure PPE usage matches the HASP • eliminate ignition sources, control static electricity, implement site controls (e.g. work zones and decontamination plan) • wear NFPA approved Bunker gear; • maintain walkways clear of obstructions; • instruct personnel in proper lifting technique • survey for and remove wreckage and debris from work areas which pose puncture and laceration hazards, wear proper PPE. • Establish an adequate, reliable water source, provide redundant fire systems
Transferring Contents of Damaged Containers	<ul style="list-style-type: none"> • Contact with hazardous materials 	<ul style="list-style-type: none"> • implement air monitoring plan and ensure PPE usage matches the HASP • implement site controls (e.g. work zones and decontamination)
Overpacking Damaged Drums	<ul style="list-style-type: none"> • Contact with hazardous materials • Pinch points • Struck by drum 	<ul style="list-style-type: none"> • implement air monitoring plan and ensure PPE usage matches the HASP • implement site controls (e.g. work zones and decontamination) • keep hands out from between drums • stand clear of drums being lifted • follow USES Drum Handling SOP
Shoveling Spilled Contaminated Solids into Shipping Containers	<ul style="list-style-type: none"> • Contact with hazardous materials • Strain/ overexertion 	<ul style="list-style-type: none"> • implement air monitoring plan and ensure PPE usage matches the HASP • implement site controls (e.g. work zones and decontamination) • do not thrust shovel into waste, push with foot • do not twist with a load shovel, move your feet • place receptacle container in front of you • pick up less wet solids on a shovel than dry

Task	Potential Hazard	Precautions
Sampling and characterization of site contaminants: <ul style="list-style-type: none"> soils waters containers 	<ul style="list-style-type: none"> Contact with contaminated liquids and/ or solids Exposure to hazardous atmospheres Slip and Fall Sharps (e.g. deteriorated drums, broken drum thief) Incompatibility reactions Explosive releases of gas/ vapors during drum opening 	<ul style="list-style-type: none"> implement air monitoring plan and ensure PPE usage matches the HASP implement site controls (e.g. work zones and decontamination plan) follow HAZCAT safety procedures follow USES Drum Handling SOP maintain walking surfaces in an even, unbroken, obstacle free condition do not use excessive force to collect samples, keep gloves dry do not sample containers unprotected from rain do not cross contaminate containers with sampling tools close containers following sample collection use remote methods for opening swollen drums use blast shields follow USES Drum Handling SOP relieve pressures slowly through closed top drums by opening smaller of two bungs first
Soil Excavation	<ul style="list-style-type: none"> Heavy Equipment Contact with contaminated soils/ waters Exposure to Hazardous Atmospheres Underground/ Overhead Utilities Excavation Cave-in 	<ul style="list-style-type: none"> maintain safe distances ground traffic maintain eye contact with operator implement air monitoring plan and ensure PPE usage matches the HASP implement site controls (e.g. work zones and decontamination plan) markout utilities maintain minimum safe distance of 10 ft from overhead power lines follow USES Excavation Safety SOP

Task	Potential Hazard	Precautions
Equipment and Debris De-contamination	<ul style="list-style-type: none"> • Heavy Equipment • Equipment maintenance • Splash of contaminated liquids • Contact with contaminated liquids and/ or solids • Exposure to hazardous atmospheres 	<ul style="list-style-type: none"> • maintain safe distances • maintain eye contact between ground crew and operator • Follow USES "Lock Out Tag Out SOP" • use approved eye protection (goggles) • implement air monitoring plan and ensure PPE usage matches the HASP • implement site controls (e.g. work zones and decontamination plan)
Demobilization	<ul style="list-style-type: none"> • Heavy manual lifting/moving • Slip/trip/hit/fall • Heavy Equipment • Falling loads 	<ul style="list-style-type: none"> • instruct personnel in proper lifting technique • mechanize repetitious lifts and lifts > 50 lbs when possible • use hand protection such as leather gloves • maintain walkways clear of obstructions. • mark hazardous area (work zone delineation • maintain safe distances • ground crew to maintain eye contact with operator • Stand clear of lifted loads

Subcontractor JSAs

Waste Management



Personal Protective Equipment

CERTIFICATION OF HAZARD ASSESSMENT

Job Title: Roll Off Driver

Hazard	Source	Minimum Required Protection
Heat	Hot objects/fluids while inspecting truck	Gloves, work boots
Impact/Penetration/Compression	Handling containers	Gloves, work boots
Harmful Dusts	Compacting materials, falling and airborne debris when outside truck on route or at post collection facility	Safety glasses
Impact	Falling debris at post collection facilities	Hard hat
Compression	Wet, uneven surfaces, obstacles	Work boots
Impact	Outside of truck, high traffic areas, on route, at post collection facility and in yard	ANSI Class II high visibility clothing

Additional Hazards

Tasks or hazards not listed must be added to this form.

This is to certify that I have performed a hazard assessment at this workplace as required by 29CFR1910.132(d), through an observation of persons performing the above job descriptions.

Certified by		Title	Date of Assessment
Site Name		Site Address	

SITE HEALTH AND SAFETY PLAN

APPENDIX B

Tailgate Safety Meeting Form

SITE HEALTH AND SAFETY PLAN

TAILGATE SAFETY MEETING FORM

GEOMATRIX PROJECT HEALTH AND SAFETY PLAN

Date: _____ Time: _____ Project No.: _____

Project Name: _____

Location: _____

Meeting Conducted by: _____

Topics Discussed:

Work Objectives for Shift:

Physical Hazards: _____

Chemical Hazards: _____

Personal Protection: _____

Decontamination: _____

Special Site Considerations: _____

Emergency Information: _____

Hospital Location: _____

Attendees

Name/Company (printed)

Signature

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Meeting Conducted by: _____

Signature

SITE HEALTH AND SAFETY PLAN

APPENDIX C

Chemical Information Sheets


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Arsenic (inorganic compounds, as As)

CAS 7440-38-2 (metal)

As (metal)

RTECS CG0525000 (metal)

Synonyms & Trade Names

Arsenic metal; Arsenia

Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]

DOT ID & Guide

1558 152 (metal)

1562 152 (dust)

Exposure Limits

NIOSH REL: Ca C 0.002 mg/m³ [15-minute] See Appendix AOSHA PEL: [1910.1018] TWA 0.010 mg/m³IDLH Ca [5 mg/m³ (as As)] See: 7440382

Conversion

Physical Description

Metal: Silver-gray or tin-white, brittle, odorless solid.

MW: 74.9

BP: Sublimes

MLT: 1135°F (Sublimes)

Sol: Insoluble

VP: 0 mmHg (approx)

IP: NA

Sp.Gr: 5.73 (metal)

Fl.P: NA

UEL: NA

LEL: NA

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities

Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Measurement Methods

NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105

See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated/Daily

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately

Skin: Soap wash immediately

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, skin and/or eye contact ingestion

Symptoms

Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]

Target Organs

Liver, kidneys, skin, lungs, lymphatic system

Cancer Site [lung & lymphatic cancer]

See also: INTRODUCTION See ICSC CARD: 0013 See MEDICAL TESTS: 0017

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Benzene

CAS 71-43-2



RTECS CY1400000

Synonyms & Trade Names

Benzol, Phenyl hydride

DOT ID & Guide

1114 130

Exposure Limits

NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A

OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F

IDLH Ca [500 ppm] See: 71432

Conversion 1 ppm = 3.19 mg/m³

Physical Description

Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1

BP: 176°F

FRZ: 42°F

Sol: 0.07%

VP: 75 mmHg

IP: 9.24 eV

Sp.Gr: 0.88

F.L.P: 12°F

UEL: 7.8%

LEL: 1.2%

Class IB Flammable Liquid: F.L.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods

NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005

See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation

Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately

Skin: Soap wash immediately

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

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p-Dichlorobenzene			CAS 106-46-7
C ₆ H ₄ Cl ₂			RTECS CZ4550000
Synonyms & Trade Names p-DCB; 1,4-Dichlorobenzene; para-Dichlorobenzene; Dichlorocide			DOT ID & Guide
Exposure Limits	NIOSH REL: Ca See Appendix A		
	OSHA PEL†: TWA 75 ppm (450 mg/m ³)		
IDLH Ca [150 ppm] See: 106467			Conversion 1 ppm = 6.01 mg/m ³
Physical Description Colorless or white crystalline solid with a mothball-like odor. [insecticide]			
MW: 147.0	BP: 345°F	MLT: 128°F	Sol: 0.008%
VP: 1.3 mmHg	IP: 8.98 eV		Sp.Gr: 1.25
FLP: 150°F	UEL: ?	LEL: 2.5%	
Combustible Solid, but may take some effort to ignite.			
Incompatibilities & Reactivities Strong oxidizers (such as chlorine or permanganate)			
Measurement Methods NIOSH 1003; OSHA 7 See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus Important additional information about respirator selection			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]			
Target Organs Liver, respiratory system, eyes, kidneys, skin			
Cancer Site [in animals: liver & kidney cancer]			
See also: INTRODUCTION See ICSC CARD: 0037 See MEDICAL TESTS: 0073			

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Chromium metal

CAS 7440-47-3

Cr

RTECS GB4200000

Synonyms & Trade Names

Chrome, Chromium

DOT ID & Guide

Exposure Limits

 NIOSH REL: TWA 0.5 mg/m³ See Appendix C

 OSHA PEL*: TWA 1 mg/m³ See Appendix C [*Note: The PEL also applies to insoluble chromium salts.]

 IDLH 250 mg/m³ (as Cr) See: 7440473

Conversion

Physical Description

Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.

MW: 52.0

BP: 4788°F

MLT: 3452°F

Sol: Insoluble

VP: 0 mmHg (approx)

IP: NA

Sp.Gr: 7.14

Fl.P: NA

UEL: NA

LEL: NA

Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.

Incompatibilities & Reactivities

Strong oxidizers (such as hydrogen peroxide), alkalis

Measurement Methods

NIOSH 7024, 7300, 7301, 7303, 9102; OSHA ID121, ID125G

See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: No recommendation

Eyes: No recommendation

Wash skin: No recommendation

Remove: No recommendation

Change: No recommendation

First Aid (See procedures)

Eye: Irrigate immediately

Skin: Soap wash

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 2.5 mg/m³:

(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*

Up to 5 mg/m³:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P filters.*

(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m³:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

Up to 25 mg/m³:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m³:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; lung fibrosis (histologic)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0029 See MEDICAL TESTS: 0052

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Methoxychlor			CAS 72-43-5
(C ₆ H ₄ OCH ₃) ₂ CHCCl ₃			RTECS KJ3675000
Synonyms & Trade Names p,p'-Dimethoxydiphenyltrichloroethane; DMDT; Methoxy-DDT; 2,2-bis(p-Methoxyphenyl)-1,1,1-trichloroethane; 1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl)ethane			DOT ID & Guide 2761 151 (organochlorine pesticide, solid, toxic)
Exposure Limits	NIOSH REL: Ca See Appendix A		
	OSHA PEL†: TWA 15 mg/m ³		
IDLH Ca [5000 mg/m ³] See: 72435		Conversion	
Physical Description Colorless to light-yellow crystals with a slight, fruity odor. [insecticide]			
MW: 345.7	BP: Decomposes	MLT: 171°F	Sol: 0.00001%
VP: Very low	IP: ?		Sp.Gr: 1.41
FLP: ?	UEL: ?	LEL: ?	
Combustible Solid, but difficult to burn.			
Incompatibilities & Reactivities Oxidizers			
Measurement Methods NIOSH S371 (II-4); OSHA PV2038 See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily		First Aid (See procedures) Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately	
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus Important additional information about respirator selection			
Exposure Routes inhalation, ingestion			
Symptoms In animals: fasciculation, trembling, convulsions; kidney, liver damage; [potential occupational carcinogen]			
Target Organs central nervous system, liver, kidneys			
Cancer Site [in animals: liver & ovarian cancer]			
See also: INTRODUCTION See ICSC CARD: 1306			

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Dieldrin		CAS 60-57-1	
C₁₂H₈Cl₆O		RTECS IO1750000	
Synonyms & Trade Names HEOD; 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,exo-5,8-dimethanonaphthalene		DOT ID & Guide 2761 151	
Exposure Limits	NIOSH REL: Ca TWA 0.25 mg/m ³ [skin] See Appendix A		
	OSHA PEL: TWA 0.25 mg/m ³ [skin]		
IDLH Ca [50 mg/m ³] See: 60571		Conversion	
Physical Description Colorless to light-tan crystals with a mild, chemical odor. [insecticide]			
MW: 380.9	BP: Decomposes	MLT: 349°F	Sol: 0.02%
VP(77°F): 8 x 10 ⁻⁷ mmHg	IP: ?		Sp.Gr: 1.75
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid			
Incompatibilities & Reactivities Strong oxidizers, active metals such as sodium, strong acids, phenols			
Measurement Methods NIOSH S283 (II-3) See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus Important additional information about respirator selection			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage			
Target Organs central nervous system, liver, kidneys, skin			
Cancer Site [in animals: lung, liver, thyroid & adrenal gland tumors]			
See also: INTRODUCTION See ICSC CARD: 0787 See MEDICAL TESTS: 0077			

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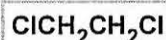
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Ethylene dichloride

CAS 107-06-2



RTECS K10525000

Synonyms & Trade Names

1,2-Dichloroethane; Ethylene chloride; Glycol dichloride

DOT ID & Guide

1184 131

Exposure Limits

NIOSH REL: Ca TWA 1 ppm (4 mg/m³) ST 2 ppm (8 mg/m³) See Appendix A See Appendix C (Chloroethanes)

OSHA PEL†: TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]

IDLH Ca [50 ppm] See: 107062

Conversion 1 ppm = 4.05 mg/m³

Physical Description

Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]

MW: 99.0

BP: 182°F

FRZ: -32°F

Sol: 0.9%

VP: 64 mmHg

IP: 11.05 eV

Sp.Gr: 1.24

F.L.P: 56°F

UEL: 16%

LEL: 6.2%

Class IB Flammable Liquid: F.L.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112°F.]

Measurement Methods

NIOSH 1003; OSHA 3

See: NMA or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation

Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately

Skin: Soap wash promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin absorption, skin and/or eye contact

Symptoms Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]

Target Organs Eyes, skin, kidneys, liver, central nervous system, cardiovascular system

Cancer Site [in animals: forestomach, mammary gland & circulatory system cancer]

See also: INTRODUCTION See ICSC CARD: 0250 See MEDICAL TESTS: 0104

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Acetone		CAS 67-64-1
(CH₃)₂CO		RTECS AL3150000
Synonyms & Trade Names Dimethyl ketone, Ketone propane, 2-Propanone		DOT ID & Guide 1090 127
Exposure Limits	NIOSH REL: TWA 250 ppm (590 mg/m ³)	
	OSHA PEL†: TWA 1000 ppm (2400 mg/m ³)	
IDLH 2500 ppm [10%LEL] See: 67641		Conversion 1 ppm = 2.38 mg/m ³
Physical Description Colorless liquid with a fragrant, mint-like odor.		
MW: 58.1	BP: 133°F	FRZ: -140°F
VP: 180 mmHg	IP: 9.69 eV	Sol: Miscible
Fl.P: 0°F	UEL: 12.8%	LEL: 2.5%
Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.		
Incompatibilities & Reactivities Oxidizers, acids		
Measurement Methods NIOSH 1300, 2555, 3800; OSHA 69 See: NMAM or OSHA Methods		
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations NIOSH Up to 2500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)* (APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)* (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister (APF = 10) Any supplied-air respirator* (APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus Important additional information about respirator selection		
Exposure Routes inhalation, ingestion, skin and/or eye contact		
Symptoms Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis		
Target Organs Eyes, skin, respiratory system, central nervous system		
See also: INTRODUCTION See ICSC CARD: 0087 See MEDICAL TESTS: 0002		

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NIOSH Publication No. 2005-149:

September 2005

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Methylene chloride			CAS 75-09-2
CH₂Cl₂			RTECS PA8050000
Synonyms & Trade Names Dichloromethane, Methylene dichloride			DOT ID & Guide 1593 160
Exposure Limits		NIOSH REL: Ca See Appendix A	
		OSHA PEL: [1910.1052] TWA 25 ppm ST 125 ppm	
IDLH Ca [2300 ppm] See: 75092		Conversion 1 ppm = 3.47 mg/m ³	
Physical Description Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.]			
MW: 84.9	BP: 104°F	FRZ: -139°F	Sol: 2%
VP: 350 mmHg	IP: 11.32 eV		Sp.Gr: 1.33
FLP: ?	UEL: 23%	LEL: 13%	
Combustible Liquid			
Incompatibilities & Reactivities Strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid			
Measurement Methods NIOSH 1005, 3800; OSHA 59, 80 See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations (See Appendix E) NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus Important additional information about respirator selection			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]			
Target Organs Eyes, skin, cardiovascular system, central nervous system			
Cancer Site [in animals: lung, liver, salivary & mammary gland tumors]			
See also: INTRODUCTION See ICSC CARD: 0058 See MEDICAL TESTS: 0148			

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SITE HEALTH AND SAFETY PLAN

APPENDIX D

Hospital Route Map





Start **Hwy 242 S & CR-324**

Helena, AR 72342

End **1801 Martin Luther King Jr Dr**

Helena, AR 72342

Travel **4.5 mi – about 9 mins**



Hwy 242 S & CR-324

Helena, AR 72342

Drive: 4.5 mi – about 9 mins

1. Head **northeast** on **AR-242** toward **Old Little Rock Rd/ Phillips Road 300**

1.0 mi
2 mins

➔ 2. Turn **right** at **US-49 S**

2.9 mi
6 mins

➔ 3. Turn **right** at **US-49**

0.6 mi
2 mins



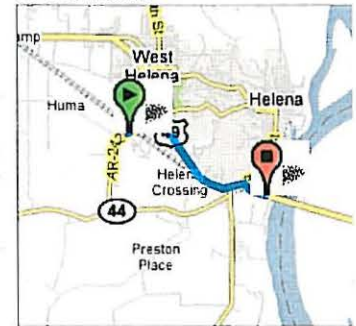
1801 Martin Luther King Jr Dr

Helena, AR 72342

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Map data ©2007 NAVTEQ™

Overview



Start



End



Map data ©2007 NAVTEQ™

Directions to Helena, AR 72342, United States

Summary and Notes

START **A** Highway 242 S & Cr-324, Helena, AR 72342, United States**FINISH** **B** 1801 Martin Luther King Jr Dr, Helena, AR 72342, United States**Total Distance: 4.6 miles, Total Time: 7 mins (approx.)**

Add your notes here...

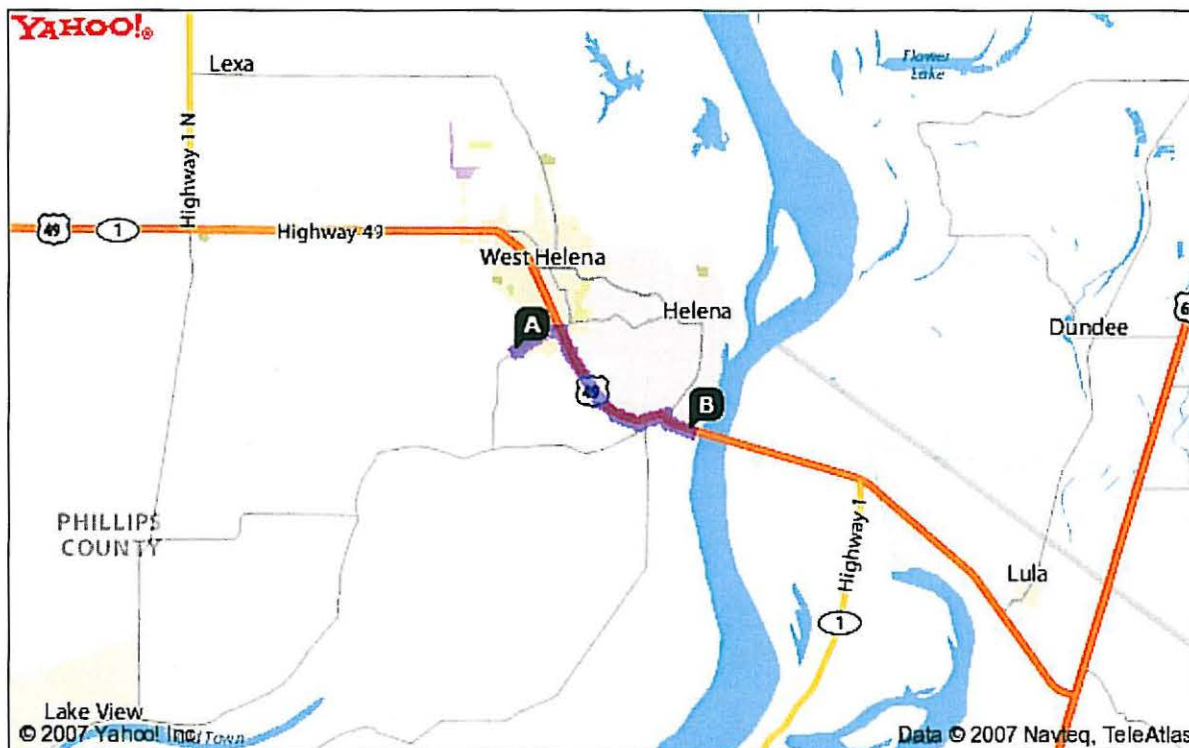
Distance

A HIGHWAY 242 S & CR-324, HELENA, AR 72342, UNITED STATES

1. Start at HIGHWAY 242 S & CR-324, HELENA go 1.0 mi
2. Turn **R** on MARTIN LUTHER KING JR DR E(US-49 S) go 2.6 mi
3. Continue to follow US-49 S go 0.9 mi
4. Arrive at 1801 MARTIN LUTHER KING JR DR, HELENA

B 1801 MARTIN LUTHER KING JR DR, HELENA, AR 72342, UNITED STATES

Distance: 4.6 miles, Time: 7 mins



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.